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Illustrated Handbook of Succulent Plants

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Illustrated Handbook of Succulent Plants

(Eggli/Hartmann Eds.)

Illustrated Handbook of Succulent Plants: Monocotyledons

Ed. by Urs Eggli (2001)

Illustrated Handbook of Succulent Plants: Dicotyledons

Ed. by Urs Eggli (2002)

Illustrated Handbook of Succulent Plants: Aizoaceae A–E

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Illustrated Handbook of Succulent Plants: Crassulaceae

Ed. by Urs Eggli (2003)

Urs Eggli (Ed.)

Illustrated Handbook of Succulent Plants: Monocotyledons

With 227 Colour Photos, Printed in 32 Colour Plates



Springer

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Preface

Handbooks devoted to succulent plants (including cacti) have a long-standing tradition, and the demand for updated editions is a good indication of the high degree of interest that exists in this fascinating group of plants.

While first handbooks devoted to the family *Cactaceae* were already published in the 19th century, the first handbook dealing with the so-called 'other' succulents was authored by Hermann Jacobsen and published in 1954 - 1955, then called "Handbuch der sukkulenten Pflanzen". A revised and enlarged English edition was made available in 1959 and was repeatedly reprinted in the following years.

A major step towards a compact handbook including short descriptions, full synonymy and hundreds of illustrations was the publication of the first edition of Hermann Jacobsen's celebrated "Sukkulentenlexikon" in 1970, followed by the English edition in 1975, and a revised German edition in 1981, finished by Klaus Hesselbarth following Hermann Jacobsen's death in August 1978.

The demand for updated compact information on succulent plants has not diminished since then, and contrary to Hermann Jacobsen's opinion (preface to the German edition 1970) that the number of papers dealing with succulent plants was on the decline, the interest in succulent plants was growing, both among hobbyists and among botanists. The results are numerous new taxa in many families, and many monographs of previously little-known groups have been published in the last 30 years. Accordingly, a need for a "New Lexicon" was beginning to be felt, both for 'other' succulents and for cacti.

After some informal initial discussions held among various botanists and interested specialist collectors, and faced with the desire of Gustav Fischer Verlag Jena, the publisher of both Backeberg's "Kakteenlexikon" and Jacobsen's "Sukkulentenlexikon", to prepare revised editions, a meeting was called for during the 1990-congress of the International Organization for Succulent Plant Study (IOS) in Zürich. There was a general feeling that the situation presented a unique occasion to produce a set of authoritative volumes embracing *all* succulent plants, and produced according to a rigid set of common standards adopted to suit all families involved. It was planned that the project, informally termed the "New IOS Succulent Plant Lexicon", should consist of three volumes, one devoted to the *Cactaceae*, one to the *Aizoaceae*, and one to the remaining succulent taxa from various families.

For various reasons, the Lexicon project took much longer to be completed. The *Cactaceae* part had not become available in time for inclusion in the present handbook edition. In the case of the *Aizoaceae*, time permitted a much more complete treatment of the family, which will be published in two volumes. Moreover, it soon became apparent that a single volume will not be sufficient to cover the vast array of the "remaining succulents". Accordingly, they will be split into four volumes (Monocotyledons, Dicotyledons, *Asclepiadaceae* and *Crassulaceae*). It is hoped that these volumes will – together with their companions – be a useful successor to Jacobsen's celebrated Lexicon.

Already Jacobsen counted on the help of various contributors for his Lexicon, and this is even more the case with the present publication. The Illustrated Handbook of Succulent Plants has sought the help of numerous specialists to provide the most up-to-date contributions on the various families and genera. The present volume derives from the close and most enjoyable collaboration between many specialists. In contrast to Jacobsen's Lexicon, the descriptions have been vastly expanded to make them as diagnostic as possible. Numerous additional data items, such as typification, etymology, etc., have been incorporated, and it is hoped that this will add to the

usefulness of the "New Lexicon" when compared with its predecessor – for users from both the botanical, the horticultural and hobby communities.

Thanks to the availability of computers and sophisticated database technology, it has been possible to considerably reduce the time needed to adapt the final manuscripts of the volumes on the "remaining succulents" for publication. The whole text of the volumes on Monocotyledons, Dicotyledons, *Asclepiadaceae* and *Crassulaceae*, including the complete nomenclature and all literature references is stored in a database, and the final version for the printing process was directly generated from this database. With this technology, the reference section as well as the index to taxa could be compiled automatically, which guarantees maximum completeness and reliability, as well as standardization. With the help of this "database publishing", it was possible to get this volume published within four months after the completion of all manuscripts and proof-reading.

Succulent plant botany will not end with the publication of this volume. In fact, the contrary is expected: It has always been the experience that the publication of a major revision or monograph hastens new research within the groups treated. This, it is hoped, will also be the result of the present publication. The compilation of it has exposed many instances where our knowledge is feeble or even non-existent. This shows that additional research is urgently called for. It is therefore the hope of the editor – and this is somewhat in contrast to the hopes of Hermann Jacobsen upon publication of his Lexicon – that succulent plant research will be enhanced by the publication of these volumes, and that a revised and updated edition will become possible in the not too distant future.

Acknowledgments

A special word of thanks goes to all the contributors of this volume. Without their help, the project to compile and edit this handbook would not have been the pleasure that it was.

The editor is most grateful to the authors for their patience with regards to the delayed publication of the handbook. The economics of book production have changed considerably during the time when the manuscripts were completed. The publisher of the original handbooks, Gustav Fischer Verlag Jena, has lamentably disappeared. After considerable uncertainties, the project has found a firm base in the publishing houses of Springer-Verlag, Heidelberg (for the English edition) and Ulmer-Verlag, Stuttgart (for the concurrent German edition). It is my pleasure to thank Dr. Dieter Czeschlik and Dr. Jutta Lindenborn from Springer-Verlag, and Roland Ulmer from Ulmer-Verlag, for their willingness to step in when everything appeared to become lost.

The compilation of the volumes treating the "remaining succulents" has been undertaken using computing infrastructure provided by the Municipal Succulent Collection Zürich (ZSS), and the permission to do so is heartily acknowledged with a deep feeling of gratitude, both to its former director Diedrich J. Supthut as well as to the present director Dr. Thomas Bolliger, and to the authorities of the City Parks Department.

Numerous persons have helped during the compilation and editing process. Foremost is Auli Lenzi (ZSS) who is thanked for her helping hand to keep the project papers organized. Gordon Rowley (Reading) has been of vital help supplying biographical information and literature in numerous cases.

Finally, I would like to thank my family, wife and son, as well as all my colleagues at ZSS and elsewhere for their patience when the handbook project kept me busy. A special word of thanks is due to Dr. Johanna Schlüter of Fischer Verlag, Jena, who so ably accompanied this project during the first three quarters of its long history.

Zürich, May 2001

U. EGGLI

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Note: ♦ = family or genus completely covered; ◇ = family or genus only partially covered;
 ~ = family or genus only mentioned; numbers in brackets = numbers of species / infraspecific
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List of Abbreviations and Symbols

Ø	diameter	Gl	gland
±	more or less, circa	Gr.	Greek
>	greater than	Gy	gynostegium
≥	greater or equal than	Ha	hair(s)
<	less than	Herb. / herb.	herbarium
≤	less or equal than	holo	holotype
×	hybrid indicator	Hort. / hort.	of gardens
		I	illustration
Anth	anthers	ICBN	International Code of Botanical Nomenclature, Tokyo Edition
Ar	areole	illeg.	illegitimate
Art.	article (of ICBN)	in sched.	"in schedis", i.e. in the herbarium
Ax	axil	incl.	including
BG	Botanical Garden	Inf	inflorescence
Bo	body	ING	Index Nominorum Genericorum
BPH	Botanico-Periodicorum-Huntianum (1968)	Int	internode
BPH/S	idem., Supplementum (1991)	invalid.	invalid
Br	branch	ITep	inner tepals
Bra	bract	KG, KGW	Karoo Garden (Worcester, RSA)
Bri	bristles	l.c.	"loco citato", i.e. at the place cited
C	central	L	leaf, leaves
Ca	carpels	lecto	lectotype
Cal	calyx	Lit	literature
Cap	capitulum	ms.	manuscript
Ci	interstaminal corona	Mt. / Mts.	Mount / Mountains
Cl	corolla	N	North, northern
Cn	corona	NBG	National Botanical Garden (RSA)
Cs	staminal corona	NE	North-East, north-eastern
cv.	cultivar	Nec	nectary
Cy	cyathium	neo	neotype
D	distribution	NGI	nectar gland
E	East, eastern	nom.	"nomen", i.e. botanical name
e.g.	for example	NSc	nectar scale
epi	epitype	NW	North-West, north-western
esp.	especially	OTep	outer tepals
Etym	Etymology	Ov	ovary
excl.	excluding	p.	page
f.	figure	p.a.	"per annum", i.e. per year
fa.	forma	p.p.	"pro parte", i.e. partly
fig.	figure		
Fil	filaments		
Fl	flower		
fl.	"floruit", i.e. living		
Fr	fruit		

Pc	pericarpel
Ped	pedicel
Per	perianth
pers. comm.	personal comment
Pet	petals
Phy	phyllaries
pl.	plate
Poll	pollinia
pp.	pages
R	roots
Rec	receptacle
Ri	ribs
Ros	rosette
RSA	Republic of South Africa
S	South, southern
s.a.	"sine anno", i.e. without year
s.l.	"sensu lato", i.e. in a wide sense
s.n.	"sine numero", i.e. without (collection) number
s.str.	"sensu stricto", i.e. in a strict sense
Sc	scale
SE	South-East, south-eastern
Se	seeds
Sect.	section
SEM	Scanning Electron Micrograph
Sep	sepals
Ser.	series
Sp	spines
SpS	spine shield
ssp.	subspecies
St	stamens
Sti	stigma
Sty	style
Subgen.	subgenus
Subsect.	subsection
Subser.	subseries
SUG	Stellenbosch University Gardens (RSA)
SW	South-West, south-western
syn	syntype
T	(nomenclatural) type
t.	plate
Tep	tepals
TL2	Taxonomic Literature, ed. 2 (1976-2000)
tt.	plates
Tu	tubercles
unpubl.	unpublished
USA	United States of America
var.	variety
W	West, western

Abbreviations for frequently cited publications

BJS	Botanische Jahrbücher für Systematik
BMI	Bulletin of Miscellaneous Information [Kew]
BT	Bothalia
CBM	Curtis's Botanical Magazine
CSJA	Cactus and Succulent Journal (US)
CUSNH	Contributions of the US National Herbarium
EJ	Euphorbia Journal
FC	Flora Capensis (ed. Harvey & al., 1860 - 1925)
FPA	Flowering Plants of Africa
FPsA	Flowering Plants of South Africa
FTA	Flora of Tropical Africa (ed. Oliver & al., 1868 - 1937)
HIP	Hooker's Icones Plantarum
JLSB	Journal of the Linnean Society, Botany
JSAB	Journal of South African Botany
KB	Kew Bulletin
KuaS	Kakteen und andere Sukkulente
NPF2	Die natürlichen Pflanzenfamilien Ed. 2 (ed. Engler & Prantl, 1924 - 1959)
PSRV	Prodromus Systematis Naturalis Regni Vegetabilis (De Candolle, 1824 - 1873)
RSN	Repertorium Specierum Novarum Regni Vegetabilis
SAJB	South African Journal of Botany
WDSE	Succulent Euphorbieae (South Africa) (White & al., 1941)

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Introduction

What is a succulent ?

It is probably impossible to define what constitutes a *succulent plant* – at least in view of the several competing definitions. For the purpose of this handbook, a pragmatic approach has been selected, and apart from the multitude of unambiguous succulents, many borderline cases are included as well, especially if the species in question are encountered in cultivation together with other succulents, and if they are native to more or less semi-arid regions and consequently show some degree of xerophytic adaptation. This, then, includes most of the caudex and pachycaul plants now popular in cultivation.

Other borderline cases included are a number of bulbous and rhizomatous monocotyledons, where examples from several genera are covered, as well as several weakly developed leaf succulents from the *Gesneriaceae* (e.g. *Columnnea*).

On the other hand, purely halophytic succulents (such as *Salicornia*) are omitted from these pages since they are as a whole neither adapted to climatically dry conditions nor encountered in collections devoted to succulent plants.

Finally, some families with undoubted claim to (xerophytic) succulence have been excluded from this set of volumes. This notably is the case for the *Cactaceae*, which will be treated elsewhere. In addition, the families *Bromeliaceae* and *Orchidaceae* are also excluded. Both count with a considerable number of mostly leaf succulents, but for both, vast specialist literature and numerous specialist societies are in existence, and this effort does not need to be duplicated here. For all these excluded families, however, a family description is included in the present volumes for the sake of completeness.

How to use this handbook

Since all information is presented in strictly alphabetical sequence of families, genera and species (except that monocotyledons and dicotyledons are treated separately, and that the families *Aizoaceae*, *Asclepiadaceae* and *Crassulaceae* occupy their own volumes), it is easy to find the entry for a given species as long as its family placement is known.

An alternative way is to use the taxonomic cross-reference index supplied at the end of the

volume. This index contains all the names treated in the volume and for accepted names indicates the page where a treatment can be found, or in the case of synonyms gives the name of the accepted taxon and a page reference as above. For names merely mentioned in the text, the index gives the page reference and the name under which information can be found.

If a completely unknown plant is to be identified, the handbook supplies keys to the genera with succulent representatives for each family. Please note that these keys are designed to work for the succulent taxa treated, and do not necessarily include the total variation encountered in a genus. If the family is not known, the reader is referred to general botanical books that include keys to plant families. Rowley (1980) and Eggli (1994) provided keys for flowering and non-flowering succulents, and Geesink & al. (1981) produced a well-known book of keys to all flowering plants worldwide.

Scope of information presented

Families

The family names adopted are always conforming to the standard form (ending in *-aceae*); alternative names (such as *Compositae* for *Asteraceae*) are not used.

Within each family, the genera are treated in alphabetical sequence, and the same applies to the sequence of species within genera. Some genera of minimal importance or with borderline succulence are only mentioned or at the most described, but no individual species are treated.

The following families are included as a whole, i.e. with all their component species: *Agavaceae*, *Aloaceae* and *Doryanthaceae* in the present volume covering the Monocotyledons, and the *Didiereaceae*, *Fouquieriaceae* and *Nolanaceae* in the Dicotyledons volume. The *Aizoaceae* and *Crassulaceae* are covered in their entirety in separate volumes within this series, and the succulent taxa of the *Asclepiadaceae* likewise occupy a separate volume of the Handbook.

The family description characterizes the family as a whole, which often includes much more variation than that observed amongst its succulent representatives.

This is followed by notes on the distribution, classification and economic importance of the family, and the occurrence of succulence if this is not a general feature of the family as a whole. Also, a key to genera with succulents is included, and special terminology used for genera and species descriptions is discussed.

The family concept adopted more or less follows Mabberley (1987), except for the monocotyledons, where Dahlgren & al. (1985) is used as a base, with a number of small modifications.

Genera and species

The entries for genera and species follow the same layout. Names of authors are given in full, with initials added where necessary according to Brummitt & Powell (1992). The literature reference of the original description or combination is followed by information on typification (where available, see below). In the case of genera, important literature is then cited. This is followed by information on geographical distribution (including notes on ecology where available) and an explanation of the etymology for generic names.

The main part of the entry is made up by the diagnostic description of the taxon, followed by a discussion of its variability, circumscription and/or application where necessary. It should be noted that these descriptions reflect major variability only, but do not include all the reported minor variations.

For larger genera, an outline of the accepted formal or informal classification is also given, with individual taxa or groups numbered in sequence. These sequence numbers are then given at the start of each taxon description to indicate its placement within the genus.

If recent conflicting classifications are available for a given group, this is shortly discussed and the classification adopted is indicated.

Minor spelling variants of epithets are not indicated; instead, the 'corrected' spelling is used throughout for accepted names and synonyms.

Infraspecific taxa

Infraspecific taxa are given in strict alphabetic order of rank and name (i.e. ranks in the sequence cv., fa., ssp., var.). This is due to the strict alphabetical sorting used when the output for the handbook was generated from a computerized database. It also means that the typical infraspecific taxon (i.e. the one repeating the species name) is not treated first as in many handbooks, but in its appropriate alphabetical sequence.

Cultivars, hybrids

Cultivars (rank abbreviated as cv.) are not included on an exhaustive base. Cultivars not associated

with a species are enumerated first, i.e. between the generic entry and the first species. Cultivars associated with a species name are included under that species, either as an entry of their own (and in the same form as subspecies etc.), or, in the case of cultivars of minor importance, in the form of a short mention in the species discussion. Cultivar nomenclature follows the guidelines of the ICBN.

Formally named hybrid genera are either included as 'genera' of their own, or dealt with in the discussion of their parent genera. The same applies to formally named hybrid species (incl. those named as cultivars). Hybrids only known with their hybrid formula are either discussed in the generic entry, or mentioned under one or the other of their parent species. No attempt has been made, however, to include all the numerous formally named hybrids.

Descriptions

The descriptions are as compact, concise and diagnostic as possible. Characters that do not vary for the group concerned are not repeated from the family or genus descriptions. In the case of genera further subdivided, information already presented in the group definitions is also not normally repeated in the descriptions of individual taxa.

Measurements

All measurements are given in metric units. Measurements without further qualifications *always refer to the long axis* of the organ described (i.e. length, height etc.); two measurements united with the $\times$ -sign stand for length $\times$ width.

Terminology

Special terms used in descriptions are explained when first used; other botanical terminology is not further explained, and the readers are referred to the numerous botanical glossaries, of which Stearn (1992) is cited by way of a most important and useful example.

Typification

This information is included for convenience when readily available, but is lacking in numerous cases. The type citations include the country and major administrative unit where the type was collected, the collector and collection number, and the herbaria where material is said or known to be deposited. The herbarium acronyms conform to *Index Herbariorum*, Ed. 8 (Holmgren & al. 1990). Where more than one herbarium acronym is given, the first relates to the holotype, the others to isotypes. Additional information on typification is sometimes added, especially in the case of lecto- or neotypes.

Nomenclatural status of names

For all taxa treated, every attempt has been made to use only valid and legitimate names, but this was not achievable in a small number of cases. In the synonym lists, the nomenclatural status (invalid, illegitimate, rejected) is indicated by citing the ICBN articles violated (following the numbering in the "Tokyo" Code). Spelling variants are considered as invalidly published according to ICBN Art. 61.

Synonymies

The synonymies given for genera and especially species are as exhaustive as possible and include all names recognized as synonyms. The first synonym(s) – if applicable – is/are the basionym and/or later combination(s) for the accepted name of the entry. All combinations of the same basionym are given in sequence of publication and are united with the $\equiv$ -sign to indicate that these are homotypic (nomenclatural) synonyms. Please note that the $\equiv$ -sign is only used for *combinations* based on the same basionym and does not indicate other homotypic synonyms (e.g. *nomina nova*). All other synonyms are headed with 'incl.' to indicate that they are, with the exception of *nomina nova* based on the same type, taxonomic synonyms (= heterotypic synonyms). Again, groups of combinations based on the same basionym are united with $\equiv$ -signs. Basionyms are given first and in chronological order.

Geographical names

Country names are listed roughly in a North to South and West to East sequence. Every attempt has been made to standardize geographical names (of countries, administrative units, regions, etc.) as far as possible, but there is a surprising amount of change relating to such names. This is specifically the case for the names of the RSA provinces, which have changed considerably during 1995, especially affecting the former Cape Province, which has been split up into 4 units (North-West Province, Northern Cape, Western Cape, Eastern Cape). We have tried as best as we could to provide the modern names in the distribution information included in the handbook, but it has been impossible to adjust all the data for type localities, where the name "Cape Prov." is still used in some cases. This results in some inconsistencies, but it is hoped that these are tolerable under the present circumstances.

Some difficulties were also encountered in a few cases where countries have been amalgamated (as in the case of the former North Yemen and South Yemen) or divided (e.g. Eritrea, formerly

part of Ethiopia). Full consistency in all these cases cannot be guaranteed.

In order to save space, geographical directions such as North, South, etc., are *always* abbreviated (N, S, etc.). Please note that *SW Africa* indicates 'southwestern Africa' and *not* the former Southwest-Africa (now Namibia). Similarly, *S Africa* indicates 'southern Africa' and *not* the Republic of South Africa, for which the abbreviation RSA is always used.

Literature references

Literature references are given for all accepted names. Normally, the publication is cited with a full abbreviation according to the standards defined in Eggli (1985) and Eggli (1998) for specialist succulent plant periodicals, or BPH (Lawrence & al. 1968) and BPH/S (Bridson & Smith 1991) for other periodicals, while TL2 of Stafleu & Cowan (1976-1988) and supplements (Stafleu & Mennega 1992-2000) are followed for book abbreviations (in both cases with some minor exceptions to conserve uniformity).

A number of frequently used titles of journals and books are further abbreviated to a short acronym, and a list of these acronyms follows the list of Abbreviations and symbols (page XI).

In the running text, literature is cited in the usual way (author and year, sometimes supplemented by a page reference), and full details can be found in the list of references at the end of the volume.

Illustrations

An attempt has been made to cite one readily accessible illustration for each species or infraspecific taxon when no illustrations are included in the literature reference for the accepted name. If the name used in the cited publication differs from the accepted name in the handbook, it is indicated (genus name abbreviated to first letter if identical, specific or infraspecific epithet omitted if identical to the accepted name).

Illustrations in the illustration section of this volume are given in bold print to distinguish them from other material cited.

Indication of authorships

For families, authorship is indicated at the end of the entry. For genera, authorship is given as a subheading after the genus heading. If more than one author has contributed species entries for a genus, each entry has its own indication of authorship as far as its authorship differs from the authorship given for the genus as a whole. It is thus possible to identify the author(s) of any entry in the handbook.

Agavaceae

Small to large perennial **Ros** plants, monocarpic (**Ros** unbranched) or polycarpic (**Ros** branched), herbs, shrubs or trees, terrestrial, very rarely epiphytic; stems none or short (then not rarely caespitose), or $\pm$ arborescent (then mostly $\pm$ branching), in part with secondary thickening growth (*Agave*, *Furcraea*, *Yucca*), partly with spreading or thick and upright rhizomes (*Yucca* p.p., *Agave* Subgen. *Manfreda*); **L** spirally arranged in **Ros**, dorsiventral, lanceolate, linear or subulate, often broadest near the base and gradually tapering towards the tip, thick and succulent, tough and fibrous or $\pm$ thin and weak (*Agave* Subgen. *Manfreda*), tip either a hard pungent **Sp** (*Yuccaeae*, *Agave* s.str.) or a $\pm$ soft (more rarely hard) point (*Beschorneria*, *Furcraea*, *Agave* Subgen. *Manfreda*), margins entire, with horny marginal teeth (these often on prominences), or filiferous; **Inf** terminal, mostly large, 0.5 - 13 m, with few or numerous **Bra**, mostly complex much-branched panicles with cymose lateral part-**Inf** consisting of monochasial units; scape (peduncle) mostly present, more rarely short to nearly none; peduncular **Bra** mostly $\pm$ similar to rosette **L**, diminishing in size upwards; floral **Bra** present; **Ped** normally present; **Fl** mostly bisexual, 3-merous, actinomorphic or slightly zygomorphic, generally in the **Ax** of well-developed **Bra**, pendent or $\pm$ upright (*Agave*), anthesis diurnal and / or nocturnal; **Tep** mostly whitish to yellow or greenish, rarely $\pm$ reddish; **Per** tube none (then **Tep** $\pm$ spreading) or **Tep** connivent to form a tube-like structure (*Beschorneria*, *Hesperaloe* p.p.), or **Per** tube present and of variable length (*Agave*), tubular or campanulate and sometimes abruptly widened and urceolate in the upper part; **St** 3 + 3, inserted at or somewhat above the base of the free **Tep** or within the **Per** tube; **Fil** mostly long and slender-filiform, rarely short, sometimes widened basally (*Furcraea*) or apically (*Yucca*), mostly glabrous, sometimes puberulent (*Yucca* p.p.); **Anth** dorsifixed, 2-thecous, sagittate to hastate (*Yuccaeae*) or oblong to linear (*Agaveae*), long or short, dehiscent introrsely with longitudinal slits; pollen primarily sulcate, rarely bisulcate (*Agave* Subgen. *Manfreda* p.p.), mainly released in monads, rarely also in tetrads (*Beschorneria*, *Furcraea*); **Ov** superior (*Yuccaeae*) or inferior (*Agaveae*), 3-locular, each locule with several to many ovules, often (generally?) with septal **Nec**; **Sty** rather long and simple or apically with 3 free and short branches (*Yucca*); **Sti** mostly single and either capitate or 3-lobed or on 3 **Sty** branches (*Yucca*), surface dry or wet; **Fr** mostly loculicidal capsules, rarely septicidal capsules or berries (*Yucca* p.p.), with several to many **Se**; **Se** mostly flat and plate-like crescent-shaped or semicircular, but sometimes less compressed (*Yucca*), black (due to phytomelans), storage tissue a perisperm (*Yucca*) or a (helobial or

nuclear) endosperm. – *Cytology*: $x = 30$, generally with 25 short and 5 long chromosome pairs.

Distribution: S Canada, N, C and S USA, Mexico (= distribution centre), C America to Panama, Caribbean Region, Colombia, Venezuela, Peru, Bolivia; widely cultivated throughout the world in suitable climates and often also naturalized.

Literature: Krause (1930); Pax & Hoffmann (1930); Hutchinson (1934); Dahlgren & al. (1985); Eguiarte & al. (1994); Bogler & Simpson (1995); Bogler & Simpson (1996); Verhoek-Williams (1998).

The *Agavaceae* are mostly adapted to arid conditions; the majority are xeromorphic and $\pm$ succulent rosette plants of desertic regions, and the family is therefore here covered in its entirety. They exhibit a high water-use efficiency connected with the common occurrence of the water-conserving CAM-mode of photosynthesis (present in all species of *Agave* so far studied and in some *Yucca* and *Hesperaloe*; see esp. Nobel (1988)). More specialized flower pollinators are common (bumblebees and carpenter bees, moths, hawkmoths, bats, hummingbirds; see Verhoek-Williams (1998)).

The bimodal karyotype (McKelvey 1933) represents a major distinguishing feature of the *Agavaceae* and similar karyotypes are otherwise only found in *Hesperocallis* ($n = 24$; *Hesperocallidaceae*) and *Hosta* (with $n = 30$ as in the *Agavaceae*; *Funkiaceae*) according to Tamura (1995) and Verhoek-Williams (1998). The *Hosta*-karyotype differs from that of the *Agavaceae* in being less pronouncedly bimodal with 4 long pairs, 2 - 3 medium-short pairs and 23 - 25 short pairs (Tamura 1995), but relations to the *Agavaceae* are also supported by embryological (Cave 1948) and serological data (Chupov & Kutivina 1981). Molecular and morphological phylogenetic studies leave somewhat uncertain whether *Hosta* represents the sister-group of *Agavaceae* (see Eguiarte & al. (1994), Bogler & Simpson (1995), Eguiarte (1995), Hernández Sandoval (1995) and Bogler & Simpson (1996)). Alternatively, *Hosta* holds an unresolved basal position within the *Agavaceae* (Bogler & Simpson 1995) or is even nested within (i.e., part of) the *Agavaceae* (Eguiarte & al. 1994). Based on the latter data, *Hosta* is included within the *Agavaceae* in the most recent molecular consensus classification (APG [Angiosperm Phylogeny Group] 1998), which is not followed here due to contrasting data and since *Hosta* differs from the *Agavaceae* in its temperate distribution (centred in Asia), non-xerophytic habit and the less bimodal karyotype; it is therefore best regarded as basal to the *Agavaceae*.

The infrafamilial classification presented below and the genera accepted in the subsequent treatments reflect the recent phylogenetic studies and

thus deviates from the most recent overview treatment of the family by Verhoek-Williams (1998):

- [1] Tribe *Yuccaeae* Bartlett 1830 (incl. subfam. *Yuccoideae* Kosteletsky 1831; incl. *Yuccaceae* J. Agardh 1858): **L** margins mostly filiferous, rarely serrulate; **Fl** pendent, actinomorphic; **Tep** free; **Ov** superior; **Anth** sagittate to hastate; embryo erect. – Recent phylogenetic studies are inconclusive as to whether tribe *Yuccaeae* is the sister group of tribe *Agaveae* (see Clary & Simpson (1995) and Bogler & Simpson (1996)), or whether the monophyletic tribe *Agaveae* is nested within tribe *Yuccaeae* rendering the latter paraphyletic (see Bogler & Simpson (1995) and Hernández Sandoval (1995)).
- [2] Tribe *Agaveae* (incl. tribe *Poliantheae* Hutchinson 1934): **L** margins entire and often with teeth, or rarely filiferous; **Fl** pendent or $\pm$ upright, actinomorphic or slightly zygomorphic; **Tep** free or $\pm$ fused to form a tube; **Ov** inferior; **Anth** oblong to linear; embryo curved.

Key to the genera

- 1 **L** margins almost always filiferous, rarely serrulate but never toothed; **Fl** pendent, actinomorphic; **Tep** free; **Anth** sagittate to hastate; **Ov** superior: 2
- **L** margins entire and with or without (often strong) teeth, rarely filiferous; **Fl** pendent or $\pm$ upright, actinomorphic or slightly zygomorphic; **Tep** free or usually forming a $\pm$ long tube; **Anth** oblong to linear; **Ov** inferior: 4
- 2 **L** margins filiferous, **L** epidermis without papillate cells; **Fl** often white and wax-like; **Fil** free, apically swollen and outcurved, sometimes puberulent; **Sty** thickened with 3 short branches; **Sti** 3 with 2 lobes each (S Canada to Guatemala): **Yucca**
- **Ros** stemless; **L** margins filiferous or finely serrulate, **L** epidermis with papillate cells over the veins; **Fil** adnate to the base or lower parts of the **Tep**, not swollen, straight, glabrous; **Sty** short and slender; **Sti** distinctly capitate and fringed with papillae: 3
- 3 Habit $\pm$ grass-like; **Ros** few-leaved; **L** margins filiferous; **Tep** connivent and **Fl** therefore narrowly campanulate, whitish to reddish (S USA (Texas), N and C Mexico): **Hesperaloe**
- Habit *Yucca*-like; **Ros** many-leaved; **L** margins finely serrulate; **Tep** openly spreading, whitish (SW USA, NW Mexico): **Hesperoyucca**
- 4 **L** margins entire or toothed; **Fl** pendent, actinomorphic; **Tep** $\pm$ free; **Fil** filiform or basally swollen; **Sty** swollen and with 3 basal ridges, distally abruptly narrowed: 5
- **L** margins entire, with or without teeth, or filiferous; **Fl** $\pm$ upright, actinomorphic or slightly zygomorphic; **Tep** basally fused to form a $\pm$ long tube; **Fil** filiform; **Sty** basally not swollen

(S USA to Colombia and Venezuela, Caribbean region):

Agave

- 5 Plants polycarpic; **L** margins entire or minutely denticulate; **Tep** free but connivent and forming a tube-like structure, reddish to yellowish; **Fil** filiform (Mexico): **Beschorneria**

- Plants monocarpic; **L** margins mostly toothed; **Tep** openly spreading, whitish to greenish; **Fil** basally swollen (Mexico to Bolivia, Caribbean region): **Furcraea**

In earlier classifications not recognizing the *Agavaceae* as a separate family, the 2 tribes here recognized were placed in widely separated positions, emphasizing the ovary position in a broadly circumscribed *Amaryllidaceae* with inferior ovaries (tribe *Agaveae*) and an equally broadly circumscribed *Liliaceae* with superior ovaries (tribe *Yuccaeae*). Hutchinson (1934) resurrected the *Agavaceae* to include 6 tribes of xerophytic genera from the Americas, Africa and Asia. Huber (1969) and Dahlgren & al. (1985) segregated the Old World genera and the New World *Nolina*-group as several separate families, leaving the *Agavaceae* as presently circumscribed.

Many species of *Agavaceae* are of considerable importance for man ('man-Agave-symbiosis'): Many species of *Agave* and *Yucca* had multiple uses in the former indigenous civilizations in the USA and Mexico. A number of species of *Agave* and *Furcraea* are important sources of fibres and are cultivated in large-scale plantations in suitable climates around the world. Several species of *Agave* are used to manufacture distilled alcoholic beverages and are the base of the Mexican pulque industry. Almost all taxa have considerable horticultural potential, and many are frequently planted as ornamentals in suitable climates. Especially in mediterranean climates, numerous species have become naturalized and today form an important feature of the landscape, together with *Opuntia* ("Prickly Pear", *Cactaceae*), which has a similar New World origin.

[J. Thiede]

AGAVE

J. Thiede

Agave Linné (Spec. Pl. [ed. 1], 323, 1753). **T:** *Agave americana* Linné [Lectotype, designated by Britton & P. Wilson, Sci. Survey Puerto Rico, 5: 156, 1923 (fide ING).]. – **Lit:** Trelease (1913); Trelease (1915b); Berger (1915); Hummelinck (1936); Hummelinck (1938); Gentry (1972); Verhoek-Williams (1975); Gentry (1982); Piña Luján (1985); Piña Luján (1986); McVaugh (1989); Hummelinck (1993); Lott & García-Mendoza (1994). **D:** S USA, Mexico, C America to Panama, whole Caribbean region, Colombia, Venezuela; cultivated worldwide in tropical and subtropical to frost-free temperate

climates and often naturalized. **Etym:** Gr. 'Agave', daughter of Kadmos and sister of Semele in Gr. mythology, also the mother of Pentheus, which she murdered in an outburst of fury; also Gr. 'agavos', stately, noble, illustrious; for the stately nature of many species, but also for the ferocious leaf margin teeth present in many species.

Incl. *Polianthes tuberosa* Linné (1753). **T:** *Polianthes tuberosa* Linné [Typification by inference, only element included.].

Incl. *Pothos* Adanson (1763) (*nom. illeg.*, Art. 53.1). **T:** not typified.

Incl. *Tuberosa* Heister ex Fabricius (1769) (*nom. illeg.*, Art. 52.1). **T:** *Polianthes tuberosa* Linné.

Incl. *Bonapartea* Willdenow (1814). **T:** *Bonapartea juncea* Willdenow.

Incl. *Littaea* Tagliabue (1816). **T:** *Littaea geminiflora* Tagliabue.

Incl. *Bravoa* Llave & Lexarza (1824). **T:** *Bravoa geminiflora* Lexarza [Typification by inference, only element included.].

Incl. *Coetocapnia* Link & Otto (1828). **T:** *Coetocapnia geminiflora* Link & Otto [Typification by inference, only element included.].

Incl. *Robynsia* Draparnaud (1841) (*nomen rejiciendum*, Art. 56.1). **T:** *Robynsia geminiflora* Draparnaud [Typification by inference, only element included.].

Incl. *Ghiesbreghtia* Roetzl (1861) (*nom. inval.*, Art. 32.1c?).

Incl. *Manfreda* Salisbury (1866). **T:** *Agave virginea* Linné.

Incl. *Allibertia* Marion (1882). **T:** *Allibertia intermedia* Marion [Typification by inference, only element included.].

Incl. *Prochnyanthes* S. Watson (1887). **T:** *Prochnyanthes viridescens* S. Watson.

Incl. *Leichtlinia* H. Ross (1893). **T:** *Agave protuberans* Engelmann ex Baker [Typification by inference, only element included.].

Incl. *Delpinoa* Ross (1897). **T:** *Delpinoa gracillima* Ross [Typification by inference, only element included.].

Incl. *Pseudobravoa* Rose (1899). **T:** *Bravoa densiflora* B. L. Robinson & Fernald.

Incl. *Runyonia* Rose (1922). **T:** *Runyonia longiflora* Rose [Typification by inference, only element included.].

Perennial xerophytic **Ros** plants, mostly **L** succulents, mono- or polycarpic, terrestrial (very rarely epiphytic); **R** tough and fibrous, sometimes fusiformly thickened (Subgen. *Manfreda*), shallowly radiating; **Ros** acaulescent or stems short, rarely elongated (*A. pedunculifera*), mostly thick, solitary or branched, sometimes rhizomatous (esp. in Subgen. *Manfreda*); **Ros** small to very large; **L** mostly long-lived, predominantly succulent and xeromorphic, more rarely $\pm$ soft and annual (Subgen. *Manfreda* p.p.), $\pm$ thick and fibrous, linear to lanceolate to ovate, usually rich in steroidal sapogenins, tip a

terminal $\pm$ strongly developed **Sp** or a soft point (Subgen. *Manfreda*); **L** margins entire, minutely to strongly toothed (then partly on prominences of the **L** margin), or filiferous; **Inf** paniculate, small to up to 12 m tall (= complete **Inf**, i.e. scape and floriferous part); part-**Inf** cymose, consisting of monochasial units, either $\pm$ short-stalked and mostly with few (rarely only paired) **Fl** (**Inf** then wrongly termed 'spikes' by Gentry (1982); Subgen. *Littaea*) or long-stalked, often several times compound, with many $\pm$ densely arranged **Fl** (**Inf** then wrongly termed 'panicles' and part-**Inf** termed 'umbels' by Gentry (1982); Subgen. *Agave*), or without a stalk and paired to single **Fl** (Subgen. *Manfreda*); **Inf** sometimes bulbiferous, esp. in species of anthropogenic origin; peduncular **Bra** $\pm$ similar to **Ros** leaves, diminishing in size upwards; **Ped** long to short or nearly none (esp. Subgen. *Manfreda*); **Fl** diurnal and / or nocturnal, actinomorphic or (slightly) zygomorphic (Subgen. *Manfreda* p.p., rarely in Subgen. *Littaea*), generally proterandrous; **Per** tubular to campanulate, usually yellow or greenish to brownish, more rarely reddish, **Tep** basally usually fused and forming a **Per** tube, much varying in length, lobes of varying length (wrongly termed 'tepals' by Gentry (1982)); **St** exerted; **Fil** filiform, normally $\pm$ long, rarely $\pm$ short, inserted in the tube or at mouth of the tube or at the **Tep** base; **Anth** versatile, oblong; pollen released in monads, sulcate (rarely bisulcate); **Ov** inferior, thick-walled, 3-locular, with numerous axile ovules in 2 rows per locule, often constricted above to a $\pm$ conspicuous neck; septal **Nec** present; **Sty** elongate, filiform, tubular, not yet fully expanded at anthesis; **Sti** 3-lobed, papillate-glandular; **Fr** dehiscent loculicidal capsules, apically often beaked (i.e. narrowly elongated); **Se** flattened, black. – *Cytology*: $x = 30$, with multiples present.

The large genus *Agave* is traditionally subdivided into the subgenera *Littaea* (flowers 'spicate' in pairs or clusters or more rarely racemose in small distinct clusters) and *Agave* (with flowers paniculate in large 'umbellate' clusters on lateral peduncles) (e.g. Gentry (1982: 61)), implying fundamental differences between both groups ('spicate' vs. 'paniculate-umbellate'). Morphologically, however, the inflorescences in (all?) *Agave* species generally represent complex panicles with cymose-monochasial part-inflorescences (Dahlgren & al. 1985). Inflorescences of *Agave* differ in the degree of branching (= number of flowers) of the part-inflorescences only and are therefore only gradually rather than fundamentally different. The few-flowered part-inflorescences characterizing Subgen. *Littaea* apparently represent the plesiomorphic condition, rendering *Littaea* paraphyletic, see the phylogenies presented by Bogler & Simpson (1996). This character is retained in Subgen. *Manfreda*, whereas the long-stalked, much-branched and many-flowered part-inflorescences of Subgen. *Agave* apparently re-

present an apomorphic feature. This might reveal monophyly of the latter, but a multiple origin of this inflorescence type cannot be ruled out.

Polyploidy (up to 8x) is common in both subgenera, but esp. so in Subgen. *Agave* (Pinkava & Baker 1985).

In all phylogenies recently published (see Bogler & Simpson l.c., Clary & Simpson (1995) and Hernández Sandoval (1995)), the genera *Manfreda*, *Prochnyanthes* and *Polianthes*, which are recognized in most recent treatments (e.g. McVaugh (1989), Verhoek-Williams (1978)) form a well-supported monophyletic clade together with the genus *Agave*. As far as these phylogenies permit a higher level of resolution, these 3 former genera (= subtribe *Poliantheae* in the sense of Verhoek-Williams (1975)) together form a monophyletic clade in which they are successively nested within *Agave*, rendering *Agave* in its traditional circumscription paraphyletic. Moreover, the generic separation of *Manfreda*, *Prochnyanthes* and *Polianthes* within the framework of the traditional classification is based on rather weak (and sometimes inconsistent) character differences, which is also noted by most authors. An example is *Agave polianthiflora*, which shows the same flower type that is used as generic character to delimit *Polianthes*. The deviating features of Subgen. *Manfreda* merely appear to result from an ecological shift towards more humid habitats connected with a change of growth form (rhizome vs. leaves as storage organ) together with a possible shift of pollinators connected with the often rather long perianth tubes. Consequently, the 3 genera of subtribe *Poliantheae* were included within a more broadly defined genus *Agave* (Thiede & Eggli 1999), and are together treated as Subgen. *Manfreda*.

The infrageneric classification of *Agave* into species groups follows Gentry (1982) for continental taxa and Trelease (1913) for the Caribbean species, albeit some of these groups appear to represent artificial assemblages only (see e.g. Ullrich (1990d)). The Caribbean species (exclusively belonging to Subgen. *Agave*) are very insufficiently known and have only been studied for regional floristic works after the last general treatment by Trelease (1913). Detailed habitat studies will most certainly result in a reduction of names and recognize some currently upheld species as mere island forms of more widespread species. Since groups represent rank-less informal taxa, no attempt has been made to clarify the complicated infrageneric nomenclature of the genus, and all untypified names were generally not further considered.

[1] Subgen. *Littaea* (Tagliabue) Baker 1888: **Inf** with $\pm$ short-stalked part-**Inf** mostly with few (rarely only paired) **Fl** ('spicate' **Inf**):

[A] 'Weakly armed group'; **L** margins entire, serrulate, filiferous or with weak teeth.

[a] **L** margins firm, not filiferous, **L** surface without white marks left by the central bud, striate, not soft, **L** margins finely serrulate; **Tep** tube well-developed; **Ov** without neck:

[1a] Group *Striatae* Baker 1888 (incl. Sect. *Chonanthagave* A. Berger 1915): Plants perennial forming large clumps; **L** narrow, linear, hard, not softly succulent, striate, margins finely serrulate; **Fl** geminate, with deep **Tep** tube; **Ov** half-inferior, without neck, merging into a well-developed **Tep** tube; **Fil** inserted in the middle of the tube, frequently at 2 levels. – 5 species in NE, C and S Mexico.

This group, esp. *A. dasylirioides*, holds the most basal position in *Agave* based on both molecular phylogenetic data (Bogler & Simpson 1995, 1996) as well as its plesiomorphic morphological features (Gentry 1982: 241-242).

[b] **L** not striate, margins firm, not filiferous, softly succulent, surface without white marks left by the central bud, margins smooth or irregularly serrulate; **Tep** tube short or none; **Ov** with a neck:

[1b] Group *Serrulatae* Baker 1877 (incl. Group *Amolae* Gentry 1982; incl. Sect. *Nizandensae* (B. Ullrich) B. Ullrich 1991 $\equiv$ Ser. *Nizandensae* B. Ullrich 1991; incl. Sect. *Yuccaefoliae* (A. Terracciano) B. Ullrich 1996 $\equiv$ Subser. *Yuccaefoliae* A. Terracciano 1885): **L** soft, margins entire, unarmed, terminal **Sp** present; **Inf** with densely arranged **Fl**; **Tep** tube shallow to medium-sized; **Fil** inserted at the mouth of the **Tep** tube. – 8 species in N, C and S Mexico (mainly Sierra Madre Occidental).

Gentry's name Group *Amolae* has to be replaced by the earlier name *Serrulatae* Baker, described to include *A. pruinosa* Lemaire, which represents a synonym of *A. attenuata* (see Ullrich (1990h), where the name *Serrulatae* is wrongly applied).

[1c] Group *Choritepalae* Gentry 1982: **L** without a terminal **Sp** (except *A. guiengolensis*); **Inf** short, dense; **Tep** tube lacking or **Tep** arising from a discoid **Rec**; **Fil** insertion not elevated. – 3 species from N Mexico and the Isthmus of Tehuantepec.

Regarded as artificial by Ullrich (1990b).

[c] **L** margins filiferous (i.e. decomposing into white threads), **L** surface with white marks left by the central bud:

[1d] Group *Filiferae* Gentry 1982: **Ros** mostly medium-sized, 30 - 90 cm tall; **L** narrow, unarmed, filiferous; **Fl** geminate, campanulate, 30 - 55 mm, **Tep** tube usually much shorter than the lobes. – 5 species in N and C Mexico (mainly Sierra Madre Occidental).

- [1e] Group *Parviflorae* Gentry 1982: **Ros** small; **L** short (very rarely exceeding 30 cm), filiferous; **Fl** small; **Per** with a tube 6 - 30 mm long, usually much exceeding the short free lobes. – 4 species from the N Sierra Madre Occidental (Mexico) and adjacent Arizona (USA).
- [B] 'Strongly armed group': **L** margins generally with large teeth (except some species of Group *Polycephalae* and Group *Marginatae*):
- [a] Plants mainly polycarpic; stems branched; **Tep** tube deep, lobes 1 - 2× as long as the tube:
- [1f] Group *Polycephalae* Gentry 1982: **L** broad, softly succulent, fleshy, margins usually with closely set teeth; **Tep** tube grooved, lobes 1 - 2× as long as the tube; **Ov** 3-angled. – 6 species from E-C to S Mexico. A wholly tropical and mostly mesophytic group.
- [b] Plants mainly monocarpic; stems simple; **Ros** often surculose; **Tep** tube shallow, lobes 2 - 6× as long as the tube (except *A. pelona*):
- [1g] Group *Marginatae* Gentry 1982: **L** with conspicuous horny margins and with conspicuous marginal teeth; **Fl** small with small **Tep** tube, lobes 5 - 6× as long as the shallow cup-like tube, frequently involute around the **Fil**. – 18 species from the S USA (S New Mexico, S Texas), Mexico and Guatemala.
- [1h] Group *Urceolatae* Gentry 1982: **L** with or without horny margins; **Ros** in small tight clusters; **Tep** lobes 2 - 3× as long as the urceolate **Tep** tube. – 1 species (*A. utahensis*) in the USA (NW Arizona, S Utah, Nevada, S California).
- [2] Subgen. *Agave*: **Inf** with long-stalked, often several times compound part-**Inf** with many ± densely arranged **Fl** ('umbellate' part-**Inf**).
- [A] 'Large-sized group': Plants medium-sized to (very) large; **Ros** ± 1 - 2.5 m tall; **L** ± 1 - 2.5 m. – Continental Species:
- [a] **L** generally not ensiform but lanceolate to ovate, much less than 10× longer than wide; **Fr** ± oblong:
- [2a] Group *Agave* (incl. Group *Americanae* Baker 1888 (*nom. illeg.*): **Ros** medium-sized to large; stems short, (freely) surculose; **L** light glaucous-grey to pale green, marginal teeth well-developed; **Inf** axis with smaller chartaceous **Bra**; **Inf** linear to long-oval in outline, part-**Inf** several times compound, not crowded; **Fl** yellow, rather slender; **Tep** tube furrowed, **Tep** not wilting until after anthesis; **Ov** shorter than the **Tep**. – 8 mainly cultivated species.
- [2b] Group *Salmianae* A. Berger 1915: **Ros** large, massive; stems short, thick, usually closely and freely surculose; **L** light green to green, mostly very large, very thick towards the base; **Inf** axis with large appressed imbricate fleshy **Bra**; **Inf** pyramidal to ovoid in outline, part-**Inf** widely branching, several times compound; **Fl** large, succulent; **Tep** tube broad, thick-walled, lobes longer than the tube, dimorphic, becoming incurved when wilting after anthesis; **Fil** often inserted at 2 levels. – 5 mainly cultivated species.
- [2c] Group *Crenatae* A. Berger 1915 (≡ Sect. *Crenatae* (A. Berger) B. Ullrich 1993): Plants solitary, unbranched, rarely surculose; stems short; **L** longer, 70 - 150 cm, green to yellow-green, young pruinose, usually with clearly visible marks left by the central bud, **L** margins deeply crenate and undulate, marginal teeth large, irregular in size and spacing, frequently with small interstitial teeth; **Inf** tall, narrow; **Tep** red or purple in bud, yellow at anthesis; **Tep** lobes 2 - 4× as long as the tube. – 7 species mainly from the Mexican Sierra Madre Occidental and the Trans-Mexican Volcanic Belt.
- [2d] Group *Campaniflorae* Trelease 1912: Stems short; **Ros** rather open, mostly solitary (except *A. capensis*); **L** rather softly succulent, 70 - 150 cm, green, margins not horny, marginal teeth moderate, uniform in size and spacing; **Fl** campanulate; **Tep** tube thin-walled, deep, broad (15 - 22 mm), lobes short, slightly exceeding the tube in length; **Fil** deeply attached. – 3 species from Baja California (Mexico).
- [2e] Group *Umbelliflorae* Trelease 1912: Stems commonly branching from **L** axils, frequently developing long branching stems resulting in fragmented clones; **L** broad and short (< 70 cm), mostly bright green; **Inf** stout, compact, part-**Inf** large, ± globular ('umbellate'), subtended by large succulent sheathing **Bra**; **Fl** large, fleshy. – 2 species in the USA (SW California) and Mexico (N Baja California).
- [b] **L** ensiform, linear, patulous, 10 - 20× as long as wide; **Tep** lobes drying reflexed on the tube; **Fr** broadly ovoid:
- [2f] Group *Viviparae* Trelease 1913 (incl. Group *Sisalanae* Trelease 1913; incl. Group *Rigidae* A. Berger 1915): Stems short to elongate; **Ros** surculose; **L** linear, ensiform, narrow, rigid, usually patulous, 10 - 20× as long as wide, margins nearly straight; **Inf** small, open; **Fl** greenish-yellow, weak; **Fr** sometimes replaced by bulbils. – 12 species, mainly in Mexico, 1 in the S USA (Florida), 1 also in C America, some cultivated only.
- Ullrich (1990d) abandoned Group *Sisala-*

- nae* sensu Gentry (1982) as an artificial assemblage and rearranged its species in other groups. He placed *A. sisalana* (the type species of Group *Sisalanae*) in Gentry's Group *Rigidae*. The latter group, however, must be renamed with the oldest name, Group *Viviparae*, whose type species *A. vivipara* turned out to be the correct name for the taxon previously named *A. angustifolia* (the type species of Gentry's *Rigidae*). The remaining species of the *Sisalanae* sensu Gentry were reclassified as follows by Ullrich (l.c.): *A. desmetiana* = [2?, unclear]; *A. kewensis* sensu Gentry (= *A. grijalvensis*) = [2j]; *A. neglecta* = [2a]; *A. sisalana* = [2f]; *A. weberi* = [2a]. The former predominantly Caribbean Group *Viviparae* is here renamed as Group *Vicinae* (see there).
- [B] 'Small-sized group': Plants mostly small to medium-sized; **Ros** $\pm 0.4 - 1$ m tall; **L** $\pm 0.2 - 1$ m. – Continental species:
- [a] Plants generally surculose; flowering period spring to summer; **Tep** tube deep, lobes short, strongly dimorphic, outer lobes conspicuously larger; **Fil** inserted at 2 levels:
- [2g] Group *Applanatae* Trelease 1912 (incl. Group *Ditepalae* Gentry 1982): Plants small to large, single or sparingly surculose; **L** mostly light glaucous, marginal teeth well-developed; **Inf** open; **Bra** scarious, reflexing, persistent; **Tep** long, leathery, unequal, generally reddish in bud, yellow at anthesis, **Tep** tube long, deep, as long or longer than the lobes, lobes dimorphic, short, usually red-tipped; **Fr** long oblong. – 12 species in N, C and S Mexico and the S USA (Arizona, New Mexico).
- [b] As in [a], but **Tep** tube shallow or deep, lobes much longer than the tube, subequal; **Fil** generally inserted all on the same level:
- [2h] Group *Deserticolae* Trelease 1912: Plants small to medium-sized; **Ros** solitary; stems none or short; **L** glaucous-grey to greenish, greyish, rough with papillae, marginal teeth firm or weak and easily detached; **Inf** narrow, part-**Inf** short; **Fl** small; **Tep** tube very short, open, lobes (1-) 3 - 5 $\times$ as long as the tube. – 10 species from the USA (SE California, Arizona) and Mexico (mainly Baja California, also Sonora) (Sonoran Desert Region).
- Without close relationship to any other Group (Gentry 1982: 354).
- [2i] Group *Parryanae* Gentry 1982: Plants small to medium-sized; **Ros** compact, suckering sparingly or prolifically with vigorous rhizomes; **L** short, broad, closely imbricate, glaucous-grey to green; marginal teeth conspicuously larger towards the
- L** tip; **Inf** scape strong; **Tep** long, slender, red to purplish in bud, **Tep** tube well-developed, shorter than the lobes; **Fr** rather small, strong-walled, ovoid to oblong. – 5 species from the S USA (California to SW Texas) and Mexico (Central Mexican Plateau to Guanajuato).
- [c] Plants not surculose; flowering period winter to early spring:
- [2j] Group *Marmoratae* A. Berger 1915: **L** grey, scabrous, crenate, terminal **Sp** small; **Fl** small, bright yellow, tube small. – 4 species from C and S Mexico and Sonora.
- [2k] Group *Costaricensis* Trelease 1913 (incl. Group *Guatemalenses* Trelease 1915 $\equiv$ Sect. *Guatemalenses* (Trelease) B. Ullrich 1992; incl. Group *Scolymoides* A. Berger 1915; incl. Group *Hiemiflorae* Gentry 1982): **Inf** narrow with very short scape; **Fl** in tightly balled clusters. – 12 species from C America (Guatemala to Costa Rica) but esp. from E-C and S Mexico.
- [C] Caribbean species:
- [2l] Group *Antillanae* Trelease 1913: **Ros** suckering; **L** fleshy, usually curved, usually green, marginal teeth usually rather large, terminal **Sp** usually elongated; **Fl** rather large (40 - 80 mm); panicles several times compound, freely fruiting, sometimes bulbiferous; **Se** rather large (6 - 9 $\times$ 4 - 6 mm). – 14 species mainly from the Greater Antilles.
- [2m] Group *Antillares* Trelease 1913: **Ros** suckering; **L** fleshy, usually curved, usually green, marginal teeth small, terminal **Sp** usually elongated; **Fl** rather small (30 - 45 mm); panicle **Br** rather simple; **Se** small (5 - 6 $\times$ 4 - 5 mm). – 6 species from Cuba.
- [2n] Group *Bahamanae* Trelease 1913: **Ros** rarely suckering; **L** usually grey, terminal **Sp** elongated; **Fl** rather large (40 - 60 mm); panicles several times compound; **Se** rather large (7 - 8 $\times$ 4 - 6 mm). – 6 species from the Bahamas.
- [2o] Group *Caribaeae* Trelease 1913 (incl.? Ser. *Columbiana* A. Berger 1915): **Ros** solitary and not suckering; **L** fleshy, usually curved, usually green, marginal teeth usually small, terminal **Sp** with stout involutely slitted base, above usually short and oblique; **Fl** rather large (40 - 80 mm); panicles several times compound, freely bulbiferous, not always fruiting; **Se** rather large (6 - 9 $\times$ 4 - 6 mm). – 8 species from the Windward Islands, recently reduced to a single species by Rogers (2000).
- [2p] Group *Inaguenses* Trelease 1913: **Ros** freely suckering; **L** hard and straight, grey; **Fl** rather small (35 - 50 mm); **Se** small (5 $\times$ 4 mm). – 2 species from the Bahamas.

- [2q] Group *Vicinae* Thiede 2001 (introduced here, type *Agave vicina* Trelease; incl. Group *Viviparae sensu* Trelease, misapplied): **Ros** suckering; **L** fleshy, usually curved, usually green, marginal teeth usually small, terminal **Sp** elongated, slender; **Fl** rather large (40 - 80 mm); panicles several times compound, freely bulbiferous, not always fruiting; **Se** rather large (6 - 9 × 4 - 6 mm). – 7 species from N South America (Colombia, Venezuela) and the Leeward Islands.
Since Trelease's Group *Viviparae* has to replace Gentry's Group *Rigidae* for nomenclatural reasons (see also there), it is here renamed based on *A. vicina*.
- [3] Subgen. *Manfreda* (Salisbury) Baker (1877) ≡ *Manfreda* Salisbury 1866 (incl. *Polianthes* Linné 1753; incl. *Bravoa* Llave & Lexarza 1824; incl. *Allibertia* Marion 1882; incl. *Delpinoa* Ross 1887; incl. *Prochnyanthes* S. Watson 1887; incl. *Leichtlinia* Ross 1893; incl. *Pseudobravoa* Rose 1899; incl. *Runyonia* Rose 1922):
- [A] Perennials with upright fleshy rhizomes; **R** fleshy and fibrous, arising from the base of the rhizome; **L** chartaceous to fleshy, green for one season or slightly longer, ending in a soft point; marginal teeth, if present, soft; **Inf** 'racemes' or 'spikes' with solitary or paired **Fl** at the nodes. – S USA, Mexico, N C America.
- [3a] Group *Manfreda* (≡ *Manfreda* Salisbury; incl. *Manfreda* Subgen. *Eumanfreda* Rose 1899 (*nom. inval.*); incl. *Manfreda* Subgen. *Pseudomanfreda* Rose 1899): Rhizome globose or oblong, large; **Fl** usually solitary at the nodes (paired only in aberrant specimens), scent sweet or unpleasant; **Tep** mostly greenish or brownish (rarely white or pink), tube short to long; **St** and **Sty** long-exserted; **Sti** trigonous or rarely 3-lobed. – S USA, Mexico, N C America.
- [3a1] *A. brunnea* Subgroup: **L** succulent, evergreen, not dying back at the end of the growing season, tip with a short soft point; **L** margins with large to small teeth $\pm \geq 1$ mm, spaced apart from each other (**L** not fleshy and with a long pungent apical point in *A. hauniensis*). – 7 species in the USA (Texas) and N Mexico.
- [3a2] *A. scabra* Subgroup: **L** thin to semi-succulent, dying back at the end of the growing season; **L** margins entire or minutely papillate; **Ov** not protruding into the **Tep** tube; **Tep** tube inserted at the tip of the **Ov**, funnel-shaped, narrowed above the **Ov**. – 10 species in C and S Mexico. This subgroup is possibly an artificial paraphyletic hold-all of the least specialized species.
- [3a3] *A. guttata* Subgroup: **L** thin to semi-succulent, dying back at the end of the growing season; **L** margins hyaline, usually minutely erose-denticulate and thus rough to the touch; **Ov** protruding into the **Tep** tube; **Tep** tube cylindrical, not narrowed above the **Ov**; **Fr** with a scar from the **Tep** in a ring around the shoulder. – 8 species from C and S Mexico and Guatemala.
- [3a4] *A. virginica* Subgroup: **L** thin to semi-succulent, dying back at the end of the growing season; **Tep** lobes erect; **Sty** markedly shorter than the **St**; **Sti** 3-lobed, lobes reflexed at maturity. – Only *A. virginica* from the C and SE USA.
- [B] Rhizome small or large; **Fl** usually paired at the nodes (solitary in *A. confertiflora*), scent sweet or absent; **Tep** white (sometimes tinged with green) to reddish, tube long; **St** and **Sty** included; **Sti** 3-lobed, lobes reflexed at maturity.
- [3b] Group *Polianthes* (≡ *Polianthes* Linné 1753): Plants medium-sized to small; **L** linear to lanceolate, herbaceous; **Tep** white, pink, red or coral-pink, tube straight or with a wide curve, narrow, gradually widening above. – 14 species from Mexico.
- [3b1] *Polianthes* Subgroup (≡ *Polianthes* Subgen. *Polianthes*): **Inf** with 3 - 8 flowering nodes; **Fl** sweet-scented; **Ov** erect or spreading; **Tep** white to pink, tube nearly horizontal towards the mouth, lobes erect or reflexed to revolute; **St** inserted near the mouth of the **Tep** tube. – 11 species from N and C Mexico.
- [3b2] *Bravoa* Subgroup (≡ *Bravoa* Llave & Lexarza 1824 ≡ *Polianthes* Subgen. *Bravoa* (Llave & Lexarza) M. Roemer 1847): **Inf** with 8 - 20 or more flowering nodes (only 3 - 5 (-9) in *A. bicolor*); **Fl** unscented; **Ov** horizontal or curved downwards; **Tep** pinkish-red, red, or coral-coloured, tube curved so that the **Fl** are pendent, lobes short, erect or flaring; **St** inserted below the middle of the **Tep** tube. – 3 species from C and S Mexico.
- [3c] Group *Prochnyanthes* (≡ *Prochnyanthes* S. Watson 1887): Mature plants large; **L** broad, narrowed basally, chartaceous; **Tep** greenish-white to greenish-red, abruptly curved near the middle, narrow below, abruptly widened above. – Only *A. bulliana* from N-C Mexico.

The genus *Agave* is of considerable importance ethnobotanically, both for the fibre and pulque in-

dustry, as well as for horticultural use (see the family description). Many species are cultivated and / or naturalized world-wide esp. in mediterranean climates.

The following names are of unresolved application but are referred to this genus: *Agave abortiva* A. Terracciano (1885); *Agave aloides* Jacobi (1866); *Agave amaniensis* Trelease & Nowell (1933); *Agave americana* Grisebach (1864) (*nom. illeg.*, Art. 53.1); *Agave xarmata* hort. ex A. Berger (1915); *Agave aspera* A. Terracciano (1885) (*nom. illeg.*, Art. 53.1); *Agave banlan* Perrotet (1824); *Agave baxteri* Baker (1888); *Agave beaulueriana* Jacobi (1868); *Agave xbeguinii* hort. ex A. Berger (1912); *Agave bennetii* hort. ex A. Berger (1915); *Agave bernhardii* Jacobi (1868); *Agave bollii* A. Terracciano (1885); *Agave bonnetii* hort. ex A. Berger (1915); *Agave brauniana* Jacobi (1866); *Agave bromeliaefolia* Salm-Dyck (1834); *Agave calderonii* Trelease (1923); *Agave chinensis* F. P. Smith (1871); *Agave cinerascens* Jacobi (1864); *Agave collina* Greenman (1897); *Agave concinna* Lemaire in Hort. Vanhoutte (1846); *Agave conduplicata* Jacobi & C. D. Bouché (1867) $\equiv$ *Agave virginica* var. *conduplicata* (Jacobi & C. D. Bouché) A. Terracciano (1885) $\equiv$ *Manfreda conduplicata* (Jacobi & C. D. Bouché) Rose (1903); *Agave cucullata* Lemaire ex Jacobi (1865); *Agave cyanophylla* Jacobi (1866); *Agave davillonii* Baker (1892); *Agave deamiana* Trelease (1915); *Agave decaisneana* Jacobi (1868); *Agave demeesteriana* Jacobi (1866); *Agave diacantha* Royle (1855); *Agave drimiaefolia* Hort. Petropol. ex Baker (1888) (*nom. inval.*, Art. 34.1c); *Agave echinoides* Jacobi (1868) $\equiv$ *Agave striata* var. *echinoides* (Jacobi) Baker (1877); *Agave ehrenbergiana* Baker (1877); *Agave ehrenbergii* Jacobi (1865); *Agave elizae* A. Berger (1915); *Agave entea* Hartwich (1897); *Agave erosa* A. Berger (1915); *Agave fenzliana* Jacobi (1866); *Agave flaccida* Jacobi (1866) (*nom. illeg.*, Art. 53.1); *Agave fourcroydes* Jacobi (1865) (*nom. illeg.*, Art. 53.1); *Agave fragrantissima* Jacquin (1762); *Agave xfranzosinii* Hort. Hanbury ex W. Watson (1889) (*nom. inval.*, Art. 32.1c?); *Agave friderici* A. Berger (1912); *Agave galeottei* Baker (1877); *Agave glabra* Karwinsky in M. Roemer (1847); *Agave glaucescens* Otto in M. Roemer (1847) (*nom. inval.*, Art. 32.1c?); *Agave goeppertiana* Jacobi (1865); *Agave grandibracteata* Ross (1892); *Agave granulosa* Scheidweiler ex C. Koch (1861); *Agave guedeneyrii* Houillet (1875); *Agave gutierreziana* Trelease (1920); *Agave haworthiana* M. Roemer (1847); *Agave haynaldii* Todaro (1876); *Agave henriquesii* Baker (1887); *Agave heteracantha* A. Berger (1898) (*nom. illeg.*, Art. 53.1); *Agave hookeri* Baker (1881) (*nom. illeg.*, Art. 53.1); *Agave horizontalis* Jacobi (1868); *Agave horizontinalis* Baker (1887) (*nom. inval.*, Art. 61.1); *Agave horrida* var. *micracantha* Baker (1877); *Agave humboldtiana* Jacobi (1866); *Agave inghamii* [?] *longissima* Hort. Whitacker ex A. Berger (1915); *Agave ixtli* C. Koch (1860) (*nom. illeg.*, Art. 53.1); *Agave kellermanniana* Trelease (1915); *Agave kerratto* Salm-Dyck (1859) (*nom. inval.*, Art. 61.1); *Agave kerratto* Baker (1892) (*nom. inval.*, Art. 61.1); *Agave kewensis* Jacobi (1866); *Agave latincincta* Verschaffelt (1868); *Agave leguayana* hort. ex Besaucèle (s.a.) (*nom. illeg.*, Art. 53.1); *Agave leguayana* Baker (1877) (*nom. illeg.*, Art. 53.1); *Agave lemairei* Hort. Verschaffelt ex Ill. Hort. (1864); *Agave lempana* Trelease (1925); *Agave lindleyi* Jacobi (1868); *Agave littaeoides* Pampanini (1909); *Agave longisepala* Todaro (1878); *Agave macrantha* Todaro (1879) (*nom. illeg.*, Art. 53.1) $\equiv$ *Agave macracantha* var. *macrantha* (Todaro) A. Terracciano (1885); *Agave maculata* Regel (1856); *Agave maculata* hort. ex A. Berger (1915) (*nom. illeg.*, Art. 53.1); *Agave malinezii* C. Koch (1862); *Agave massiliensis* hort. ex A. Berger (1912); *Agave maximowicziana* Regel (1890); *Agave milleri* Salm-Dyck (1834) (*nom. illeg.*, Art. 53.1); *Agave minarum* Trelease (1915); *Agave monostachya* Sessé & Mocino (1894); *Agave xmortolensis* A. Berger (*pro sp.*) (1912); *Agave muelleriana* A. Berger (1915); *Agave multiflora* Todaro (1890); *Agave nigromarginata* Hort. De Smet ex Besaucèle (s.a.); *Agave nirvana* Herbin & Robins (1968) (*nom. inval.*, Art. 36.1, 37.1); *Agave nissonii* Baker (1874); *Agave offroyana* De Smet ex Jacobi (1865); *Agave ortgiesiana* Todaro (s.a.) (*nom. illeg.*, Art. 53.1) $\equiv$ *Agave filifera* fa. *ortgiesiana* (Todaro) H. Jacobsen (1954) (*nom. inval.*, Art. 33.2); *Agave pallida* Sartorius ex Jacobi (1865) (*nom. illeg.*, Art. 53.1); *Agave pampaniniana* A. Berger (1915); *Agave paupera* A. Berger (1915); *Agave pavoliniana* Pampanini (1910); *Agave perlucida* Jacobi (1868); *Agave xpfersdorffii* hort. ex Besaucèle (*pro sp.*) (s.a.); *Agave planera* Fasio (1903) (*nom. inval.*, Art. 32.1c); *Agave polianthoides* Schiede ex Schlechtendal (1844); *Agave polianthoides* M. Roemer (1847) (*nom. illeg.*, Art. 53.1); *Agave polyacantha* Haworth (1821); *Agave pringlei* hort. ex A. Berger (1912); *Agave prostrata* Martius ex Dragendorff (1898) (*nom. inval.*, Art. 32.1c); *Agave pulcherrima* Otto in M. Roemer (1847); *Agave pulverulenta* Verschaffelt (1863); *Agave pumila* Simon ex Besaucèle (s.a.) (*nom. illeg.*, Art. 53.1); *Agave purpurea* Souza Novelo (1941) (*nom. inval.*, Art. 36.1); *Agave ragusae* Todaro (1897); *Agave regia* Baker (1877); *Agave richardsii* hort. ex G. Nicholson (1884); *Agave rohanii* Jacobi (s.a.); *Agave rohanii* hort. ex A. Berger (1915) (*nom. illeg.*, Art. 53.1); *Agave romani* Hort. De Smet ex Besaucèle (s.a.); *Agave xromanii* Hort. De Smet ex Baker (1888); *Agave rovelliana* Todaro (1876); *Agave rudis* Lemaire ex Jacobi (1865); *Agave saponifera* H. Grothe (1880); *Agave schidigera* var. *ortgiesiana* Baker (1877) $\equiv$ *Agave ortgiesiana* (Baker) Trelease (1914) (*nom. illeg.*, Art. 53.1); *Agave schneideriana* A. Berger (1915); *Agave scolymus* Dietrich (1843) (*nom. illeg.*, Art. 53.1); *Agave scolymus*

Kunth (1850) (*nom. illeg.*, Art. 53.1); *Agave serrulata* Steudel (1841); *Agave silvestris* hort. ex A. Berger (1915); *Agave simoni* André (1904); *Agave simonii* hort. ex Besaucèle (s.a.); *Agave smithiana* Jacobi (1866); *Agave sordida* A. Berger (1915); *Agave subinermis* M. Roemer (1847); *Agave x taylorae* Hort. Veitch (1877) (*nom. illeg.*, Art. 52.1); *Agave taylorii* Hort. Williams (1874); *Agave teoxomuliana* Karwinsky ex M. Roemer (1847); *Agave terraccianoi* Pax (1893); *Agave thomsoniana* Jacobi (1866); *Agave toeniata* hort. ex Besaucèle (s.a.); *Agave toneliana* hort. ex Besaucèle (s.a.) (*nom. illeg.*, Art. 53.1); *Agave toneliana* Baker (1881) (*nom. illeg.*, Art. 53.1); *Agave troubetskoyana* Baker (1892); *Agave undulata* Klotzsch (1840) $\equiv$ *Manfreda undulata* (Klotzsch) Rose (1903); *Agave undulata* var. *strictior* Jacobi & C. D. Bouché (1865); *Agave vandervinnii* Lemaire (1864); *Agave xvillae* Pirotti ex Baker (1892) (*nom. inval.*, Art. 61.1); *Agave xvillarum* André (1886); *Agave viridissima* Baker (1877); *Agave vivipara* Salm-Dyck (1859) (*nom. illeg.*, Art. 53.1); *Agave washingtonensis* Rose (1898); *Agave watsonii* J. R. Drummond & C. H. Wright (1907); *Agave weissenburgensis* Wittmach ex Baker (1889) (*nom. inval.*, Art. 61.1?); *Agave wiesenbergensis* Wittmack (1885); *Agave wiesenbergensis* Wittmack (1885) (*nom. inval.*, Art. 61.1); *Agave wildringii* Britton (1911); *Agave x winteriana* A. Berger (1915); *Agave zuccarinii* Otto (1842); *Polianthes americana* Sessé & Moçño (1888); *Polianthes ensifolia* hort. ex Steudel (1840); *Polianthes pygmaea* Jacquin (1793).

A. acicularis Trelease (Mem. Nation. Acad. Sci. 11: 34, t. 52, 1913). **T:** Cuba, Santa Clara (Britton & al. 5926 [NY]). – **Lit:** León (1946). **D:** C Cuba.

[21] **L** lanceolate, $\pm 100 \times 12$ cm, slightly greyish, dull, margins slightly concave; marginal teeth gently upcurved, 2 - 3 mm, chestnut-brown, 10 - 15 mm apart, below the middle more distant, larger and reflexed, occasionally with outcurved point; terminal **Sp** stoutly acicular, straight, subtriangularly grooved below the middle, smooth, 2.5 cm, grey-brown, slightly glossy, decurrent; **Inf** 'paniculate', not known to be bulbiferous; **Ped** scarcely 5 mm; **Fl** 40 - 45 mm; **Ov** fusiform, 25 mm, exceeding the **Tep** in length; **Tep** yellow, tube open, ± 5 mm, lobes 12 - 15 mm; **Fr** apparently becoming almost pear-shaped and a little stipitate or beaked.

A. acklinicola Trelease (Mem. Nation. Acad. Sci. 11: 41, t. 91, 1913). **T** [syn]: Bahamas, Acklin Island (Brace 4442 [NY]). – **Lit:** Correll & Correll (1982). **D:** Bahamas (Acklin Island).

[2n] **Ros** solitary; **L** rather narrowly lanceolate, concave, occasionally somewhat canaliculate, to 300×15 cm, dull greyish; marginal teeth straight or gently curved, rather acuminate deltoid, often from oblique green prominences or with lenticular

bases, 1 - 1.5 mm, 5 - 10 mm apart; terminal **Sp** conical, somewhat flexuously recurved, involutely grooved to or beyond the middle, smooth, 2 - 2.5 cm, red-brown, becoming grey, glossy, decurrent; **Inf** unknown.

A. aktites Gentry (US Dept. Agric. Handb. 399: 148-150, ill., 1972). **T:** Mexico, Sinaloa (Gentry 11470 [US, DES, MEXU]). – **D:** Mexico (Sonora, Sinaloa); sand dunes with coastal thorn forest. **I:** Gentry (1982: 555, 557).

[2f] Stems broadly globose; **Ros** small, 40 - 70 $\times$ 60 - 110 cm, surculose; **L** linear, straight, patent, unequal within a **Ros**, broadly clasping at the base, smooth or asperous, 40 - 60 $\times$ 2 - 4 cm, bluish glaucous-grey, sometimes with transverse zonal pattern; marginal teeth generally upcurved, with slender flexuous tips, 3 - 5 mm, irregularly spaced, 1 - 3 or 4 - 5 cm apart; terminal **Sp** abruptly subulate, usually broad at the base and flattened above, 1.2 - 2 cm, dark brown to greyish; **Inf** 3 - 4 m, 'paniculate', narrow, part-**Inf** 10 - 15 in the upper $\frac{1}{4}$ - $\frac{1}{2}$ of the **Inf**, short, small; **Fl** 64 - 70 mm; **Ov** 26 - 31 mm, neckless; **Tep** sticking together and not opening properly, quickly wilting, pale greenish, tube 14 - 16 mm, lobes unequal, 21 - 25 mm.

This is the only Mexican *Agave* growing naturally and regularly in the maritime zone of beach dunes, to which habitat it appears to be limited (Gentry 1982: 558).

A. albescens Trelease (Mem. Nation. Acad. Sci. 11: 44, t. 53, 116, 1913). **T:** Cuba (Britton 2085 [NY?]). – **Lit:** León (1946). **D:** SE Cuba.

[2m] **Ros** solitary; **L** oblong-lanceolate, conduplicate, flattish, slightly rough, $\pm 45 \times 15$ cm, light grey, dull, passing to glaucous and banded, margins nearly straight; marginal teeth usually straight or gently curved, broadly triangular or acuminate deltoid, 2 - 3 mm, ± 1 cm apart; terminal **Sp** conical, somewhat recurved, shallowly grooved below the middle, dull, sometimes roughened except at the tip, 1.5 cm, blackish-chestnut-brown, very shortly decurrent; **Inf** 'paniculate', 5 m; **Ped** slender; **Fl** 30 - 35 mm; **Ov** fusiform, 15 mm, shorter than the **Tep**; **Tep** golden-yellow, tube open, 5 - 6 mm, lobes 12 - 14 mm, rather shorter than the **Ov**.

A small species variable in leaf characters. According to the protologue, it differs from the few other grey-leaved Cuban species in the granular roughening of the leaves and the finally purplish-black colour of the terminal spine and marginal teeth.

A. albomarginata Gentry (Agaves Cont. North Amer., 129-131, ill., 1982). **T:** Ex cult. (Gentry 19811 [US, DES]). – **D:** Known from cultivation only.

[1g] Stem subcaulescent; **Ros** open, freely suckering; **L** few, lanceolate-linear, straightly as-

ending, convex below, somewhat keeled towards the base, nearly flat above, 100 - 125 × 4 (near the base) / 2.5 cm (in the middle), greyish-green, margins thin, horny, somewhat friable, white; marginal teeth in the middle of the **L** white like the margin, thin, recurved, 2 - 4 mm, 3 - 5 cm apart, towards the **L** base blunt, 1 - 2 cm apart, distal 1/3 of the **L** toothless; terminal **Sp** subulate, with a rounded groove above, 1.5 cm, grey with dark tip, thinly decurrent; **Inf** 4 - 6 m, 'spicate', slender, laxly flowered, part-**Inf** with 2 or 3 **Fl**; **Ped** short, thick; **Fl** 35 - 40 mm; **Ov** fusiform, 18 - 22 mm, neck thick, grooved; **Tep** pale to greenish-yellow, tube openly spreading, 4 - 5 mm, lobes equal, 13 - 14 mm.

Perhaps better treated as a var. or ssp. of the closely related *A. lechuguilla*, but more extreme in morphological characters than other variants of the taxon (Gentry 1982: 130).

A. americana Linné (Spec. Pl. [ed. 1], 323, 1753). **T**: LINN 443.1. – **D**: USA, Mexico; cultivated worldwide in frost-free climates, and locally naturalized.

A. americana ssp. *americana* – **D**: USA (SE Texas), Mexico; cultivated widely. **I**: Gentry (1982: 276, 280).

Incl. *Agave americana* var. *americana*; **incl.** *Agave virginica* Miller (1768) (*nom. illeg.*, Art. 53.1); **incl.** *Agave ramosa* Moench (1794); **incl.** *Agave spectabilis* Salisbury (1796); **incl.** *Agave theometel* Zuccagni (1809) = *Agave americana* var. *theometel* (Zuccagni) A. Terracciano (1885); **incl.** *Agave milleri* Haworth (1812); **incl.** *Agave variegata* Steudel (1821) (*nom. inval.*, Art. 32.1c); **incl.** *Agave picta* Salm-Dyck (1859) = *Agave longifolia* var. *picta* (Salm-Dyck) Regel (1865) = *Agave mexicana* var. *picta* (Salm-Dyck) Cels (1865) = *Agave milleri* var. *picta* (Salm-Dyck) van Houtte (1868) = *Agave americana* var. *picta* (Salm-Dyck) A. Terracciano (1885) = *Agave ingens* var. *picta* (Salm-Dyck) A. Berger (1912); **incl.** *Agave altissima* Zumaglini (1864); **incl.** *Agave fuerstenbergii* Jacobi (1870); **incl.** *Agave communis* Gaterau (1889); **incl.** *Agave picta* A. Berger (1904) (*nom. illeg.*, Art. 53.1); **incl.** *Agave americana* var. *marginata* Trelease (1908); **incl.** *Agave americana* var. *medio-picta* Trelease (1908); **incl.** *Agave americana* var. *striata* Trelease (1908); **incl.** *Agave americana* var. *marginata alba* Trelease (1908) (*nom. inval.*, Art. 23.1); **incl.** *Agave americana* var. *marginata aurea* Trelease (1908) (*nom. inval.*, Art. 23.1); **incl.** *Agave americana* var. *marginata pallida* Trelease (1908) (*nom. inval.*, Art. 23.1); **incl.** *Agave celsiana* hort. ex A. Berger (1911) (*nom. illeg.*, Art. 53.1); **incl.** *Agave ingens* A. Berger (1912); **incl.** *Agave complicata* Trelease ex Ochoterena (1913); **incl.** *Agave gracilispina* Engelmann ex Trelease (1914); **incl.** *Agave melliflua* Trelease (1914); **incl.** *Agave zonata* Trelease (1914); **incl.** *Agave tingens* A. Berger (1915); **incl.** *Agave felina* Trelease (1920); **incl.** *Agave rasconensis* Tre-

lease (1920); **incl.** *Agave subzonata* Trelease (1920); **incl.** *Agave americana* [?] *nairobensis* Herbin & Robins (1968) (*nom. inval.*, Art. 36.1, 37.1).

[2a] Stem short; **Ros** 1 - 2 × 2 - 3.7 m, freely suckering; **L** lanceolate, narrowed above the thickened base, usually acuminate, some **L** reflexed above the middle of the lamina, plane or guttered, smooth to slightly asperous, mostly 1 - 2 m × 15 - 25 cm, light grey-glaucous to light green, sometimes variegated, margins undulate to crenate; marginal teeth variable, larger 5 - 10 mm, brown to pruinose-grey, 2 - 6 cm apart, from broad low bases, the slender cusps straight to flexuous or curved; terminal **Sp** conical to subulate, mostly 3 - 5 cm, shiny brown to pruinose-grey; **Inf** 5 - 9 m, 'paniculate', slender, straight, long-oval in outline, rather open, part-**Inf** 15 - 35, in the upper 1/3 - 1/2 of the **Inf**, spreading; **Fl** slender, 7 - 10 cm; **Ov** 3 - 4.5 cm, greenish, neck grooved, tapering to the narrower base; **Tep** yellow, tube funnel-shaped, 8 - 20 mm, lobes unequal, 25 - 35 mm. – *Cytology*: 2n = 60, 120, 180, 240.

The leaves are often reflexed above the middle, and this is a characteristic feature of the species. The flowers exhibit a short tapering ovary that is shorter than the tepals. It is a very polymorphic species cultivated worldwide in many variants, esp. in winter-rainfall climates (Gentry 1982: 278).

A. americana ssp. *protoamericana* Gentry (Agaves Cont. North Amer., 287-290, ill., 1982). **T**: Mexico, Nuevo León (Gentry & Barclay 20156 [US, DES, MEXU]). – **D**: USA (Texas); Mexico (Nuevo León, Tamaulipas, San Luis Potosí); open slopes in tropical deciduous and thorn forest, 500 - 1400 m.

[2a] Differs from ssp. *americana*: **L** generally shorter, shortly narrowed above the thick and fleshy base, 0.8 - 1.35 m × 17 - 22 cm, light glaucous-grey to pale green, sometimes cross-zoned; **Inf** generally with fewer (15 - 20) part-**Inf**; **Tep** tube deeply funnel-shaped, longer, 15 - 20 mm.

Regarded as the wild progenitor of the many cultivated *A. americana* ssp. *americana* types. It shows apparent introgression with *A. asperima* (as *A. scabra*) (Gentry 1982: 289).

A. americana var. *expansa* (Jacobi) Gentry (US Dept. Agric. Handb. 399: 80, 1972). – **Lit**: McVaugh (1989). **D**: Cultivated only (USA [California, Arizona], Mexico [Jalisco]). **I**: Gentry (1982: 276, 283).

= *Agave expansa* Jacobi (1868); **incl.** *Agave abrupta* Trelease (1920).

[2a] Differs from ssp. *americana*: Stem forming a short trunk in age, to 60 cm; **L** glaucous-grey, frequently cross-zoned, margins crenate; marginal teeth along the middle of the lamina on several sharply angled low tubercles; **Fl** 7 - 8.5 cm. – *Cytology*: 2n = 119.

Known only as a cultivar (and better to be named as such) used for the pulque industry, first introduced into W Europe where it was described by Jacobi (Gentry 1982: 283).

A. americana var. **oaxacensis** Gentry (Agaves Cont. North Amer., 285-287, ill., 1982). **T:** Mexico, Oaxaca (Gentry & Arguelles 12260 [US, DES, MEXU]). – **D:** Cultivated only (Mexico: Oaxaca).

[2a] Differs from ssp. *americana*: **L** not reflexed, spreading, very large, 1.2 - 2 m × 18 - 24 cm, glaucous-white, margins nearly straight; marginal teeth closely set, not mamillate; **Inf** large, to 10 m; **Fl** large, 9.5 - 10.5 cm.

Observed in cultivation only (and thus better treated as a cultivar), esp. in the Oaxaca Valley, but similar plants were also observed elsewhere. Formerly grown for fibre and pulque, but now abandoned (Gentry 1982: 287).

A. angustiarum Trelease (CUSNH 23: 138, 1920). **T:** Mexico, Guerrero (Trelease 17+77 [MO]). – **D:** Mexico (Michoacán, México, Morelos, Puebla, Guerrero, Oaxaca); on cliffs, 600 - 1500 m. **I:** Gentry (1982: 134).

[1g] **Ros** subcaulescent, open, solitary; **L** few, linear to lanceolate, straight, thick, firm, long acuminate, plane to concave above, convexly thickened below, 50 - 80 × 6 - 7 cm, green or pruinose-glaucous (both forms in mixed populations), margins horny, continuous; marginal teeth straight or slanted downwards but commonly upcurved, flattened, largest somewhat scattered, mostly 4 - 7 mm, brown to grey, 1 - 3 cm apart, characteristically without teeth below the **L** tip for ¼ - ½ of the **L** length; terminal **Sp** acicular, well rounded, narrowly grooved above, with conspicuous median protrusion below, 3 - 4.5 cm, long decurrent to the upper teeth; **Inf** 'spicate', 2 - 4 m, slender; **Fl** 35 - 40 mm; **Ov** 15 mm, neck narrow; **Tep** glaucous greenish-white, tube 4 - 5 mm, lobes 16 mm.

Distinguished by its long narrow leaves that are toothless along the long-tapering apex, and the protruding spine-base. The taxon may be confused with some forms of *A. kerchovei* (Gentry 1982: 134-135).

A. anomala Trelease (Mem. Nation. Acad. Sci. 11: 36, t. 66, 1913). **T:** Cuba (Shafer 1409 [MO?]). – **D:** E Cuba (Holguin to Myabe).

[2l] **Ros** unknown; **L** elongate-lanceolate, rather gradually pointed, 75 - 100 × 7.5 cm, green, margins not repand, unarmed or with few and very small teeth towards the base; terminal **Sp** unguiculate recurved, conically subulate, smooth, rather dull, 3 - 10 mm, reddish-brown, shortly decurrent and dorsally immersed into the green tissue; **Inf** unknown, not known to be bulbiferous; **Ped** ± 10 mm and slender or 40 mm and much stouter; **Fl** 55 - 60 (-70) mm; **Ov** oblong-fusiform, 30 - 40 mm, rather longer than the **Tep**; **Tep** yellow, tube conical, 8 - 10 mm,

lobes 20 × 4 - 5 mm; **Fr** (abnormal) narrowly pear-shaped and oblong, 40 × 15 mm, somewhat stipitate and beaked.

The only native Caribbean species that lacks marginal teeth (Trelease l.c.). The species was described based on the type collection only and has apparently not been recollected since.

A. antillarum Descourtilz (Fl. Méd. Antilles 4: 239, pl. 284, 1827). – **Lit:** Trelease (1913: with ill.); León (1946). **D:** Hispaniola (Haiti, Dominican Republic).

Incl. *Agave vivipara* Lamarck (1783) (*nom. illeg.*, Art. 53.1); **incl.** *Agave dominicensis* Ruse (1893) (*nom. inval.*, Art. 32.1c); **incl.** *Agave americana* Urban (1903) (*nom. illeg.*, Art. 53.1).

This is the earliest named species of the group, but is only inaccurately described. Engelmann (1875) equated it with the short-flowered *Agave* of S Haiti, and he was followed by later authors (Trelease 1913: 31).

A. antillarum var. **antillarum** – **D:** Hispaniola (Haiti, Dominican Republic).

[2l] Stem none; **Ros** solitary; **L** lanceolate, gradually acute, somewhat concave, ± 100 × 8 cm, bright green, margins typically nearly straight; marginal teeth straight or upcurved, narrowly triangular from lenticular bases or acuminate deltoid, 2 - 3 mm, 1 - 2.5 cm apart; terminal **Sp** conical, nearly straight, involutely grooved near the base, smooth, 1.5 - 2 cm, brown, dull, decurrent; **Inf** ± 5 m (?), 'paniculate', narrowly oblong, part-**Inf** with ascending **Br** and densely clustered **Fl**, in the upper ¼ or ½ of the **Inf**, not known to be bulbiferous; **Ped** 5 - 10 mm; **Fl** 40 - 50 mm; **Ov** oblong-fusiform, 25 - 30 mm, longer than the **Tep**; **Tep** deep orange, tube open, scarcely 5 mm, lobes 15 mm; **Fr** narrowly oblong, stipitate and beaked, 40 - 45 × 15 mm.

A. antillarum var. **grammontensis** Trelease (RSN 23: 362, 1927). **T:** Hispaniola, Haiti (Ekman 3355 [MO?]). – **D:** Hispaniola (Haiti).

[2l] Differs from var. *antillarum*: **L** glaucous; marginal teeth in the middle of the **L** heavily triangular, 5 mm, 0.5 - 1 cm apart, margins between the teeth concave; **Tep** orange, almost cochineal-red within; **Fr** unknown.

A. apedicellata Thiede & Eggli (KuaS 50(5): 111, 1999). **T:** Mexico, San Luis Potosí (Parry & Palmer 867 [US]). – **D:** Mexico (San Luis Potosí); 2450 m, known from the type collection only.

Incl. *Bravoa sessiliflora* Hemsley (1880) ≡ *Polyanthes sessiliflora* (Hemsley) Rose (1903).

[3b1] Plants slender; **L** linear, narrow, obtuse, 3 - 5 mm broad; **Inf** 'spicate', almost glabrous, 2 - 3 × as long as the **L**; **Bra** broadly ovate, acute or shortly acuminate, small; **Fl** sessile, to 54 mm, mostly geminate; **Tep** white, tube narrow; **Sti** included.

Insufficiently known. Upon transfer to *Agave*, *Polianthes sessiliflora* needed a new name due to *Agave sessiliflora* Hemsley 1880.

A. applanata Koch ex Jacobi (Hamburg. Gart.- & Blumenzeit. 20: 550, 1864). **T** [neo]: Mexico, Veracruz (*Trelease* 1 [MO]). – **D**: Mexico (Chihuahua, Durango, Zacatecas, Guanajuato, Querétaro, Hidalgo, México, Puebla, Veracruz, Oaxaca). **I**: Gentry (1982: 421, 424).

Incl. *Agave schnittspahnii* Jacobi (1865).

[2g] **Ros** 0.5 - 1 (-2 cult.) × 1 - 2 (-3 cult.) m, solitary; **L** many, linear-lanceolate, very rigid, usually widest at or near the base, 40 - 60 × 7 - 10 cm, mature **L** much longer than earlier stages, margins horny throughout or lacking in the middle of the lamina; marginal teeth nearly straight or frequently curved downwards, very strong, sharp, larger teeth (middle of the lamina) 8 - 15 mm, dark brown becoming light waxy pruinose, mostly 4 - 6 cm apart; terminal **Sp** very strong, flat or broadly hollowed above, 3 - 7 cm, dark reddish-brown becoming greyish with age, decurrent along the margin; **Inf** 4 - 8 m, 'paniculate', narrow, scape rather short, part-**Inf** numerous; **Fl** 55 - 80 mm; **Ov** angularly cylindrical, 35 - 38 mm, greenish; **Tep** yellow, tube 15 - 22 mm, lobes unequal, outer 15 - 22 mm.

This taxon appears to be endemic to Veracruz and adjacent Puebla and is cultivated as a cottage plant elsewhere. It was possibly disseminated to the North by men in (pre-) historic times (Gentry 1982: 424-425).

A. ×arizonica Gentry & J. H. Weber *pro sp.* (CSJA 42(5): 222-225, ills., 1970). **T**: USA, Arizona (Weber s.n. [US, ASU, DES]). – **D**: USA (Arizona); open rocky slopes in Chaparral or Juniper Grassland, 1100 - 1450 m. **I**: Gentry (1982: 255-256).

Identified as the possible natural hybrid *A. toumeyana* ssp. *bella* × *A. chrysantha* by Reichenbacher (1985), Pinkava & Baker (1985) and others. Only about 50 - 60 individuals are known (Hodgson 1999).

A. arubensis Hummelinck (Recueil Trav. Bot. Néerl. 33: 236-237, 248, fig. 14-15, pl. 3a, 4, 1936). **T** [syn]: Aruba (*Hummelinck* 17a+b [U]). – **Lit**: Hummelinck (1993: with ills.). **D**: Leeward Islands (Aruba); debris of coral rocks.

[2q] **Ros** 1.3 - 1.6 m Ø, suckering (?); **L** rather few, broadly lanceolate, slightly S-curved, widest somewhat below or in the middle, usually slightly acuminate, usually guttered and lower face round, 60 - 80 × 13 - 14 cm; marginal teeth usually pointing downwards somewhat below the middle of the **L**, often upcurved at the top, slender-aciculate, 4 - 6 (-7) mm, 8 - 12 per 10 cm, on rather weakly to strongly developed green or hardening tubercles; terminal **Sp** acicular, straight or very slightly up-

curved at the tip, narrowly to broadly grooved below or to the middle, usually rough, covered with many minute tubercles, 2.7 - 3.2 cm, shortly decurrent; **Inf** 3.5 - 5 m, 'paniculate', narrowly oblong, part-**Inf** rather many, in the upper ¼ - ⅓ of the **Inf**, forming few **Fr** but freely bulbilliferous; **Tep** 19 - 21 mm, tube 7 - 8 mm; **Fr** narrowly oblong, long-stipitate and beaked, 3.3 - 4 × 1.2 - 1.5 cm.

According to the protologue hardly different from *A. vicina* (as *A. vivipara*) in vegetative characters, but clearly differing in generative parts (small number of bracts, long tube with filaments inserted low down, form of capsules).

A. asperima Jacobi (Hamburg. Gart.- & Blumenzeit. 20: 561, 1864). **T** [neo]: USA, Texas (Gentry & Barclay 20012 [US, DES]). – **D**: USA (Texas); Mexico (widespread).

Since *A. scabra* Salm-Dyck (1859) is an illegitimate later homonym of *A. scabra* Ortega (1797) but was misapplied to this plant by Gentry (1982: 296), Ullrich (1992f) resurrected *A. asperima* Jacobi as the valid name for *A. scabra sensu* Gentry and placed the 'true' *A. scabra* Salm-Dyck in the synonymy of *A. parryi*. The taxon is related to *A. americana*, with which it intergrades. It is the most widespread and common *Agave* in the Chihuahuan Desert of N Mexico, with the exception of *A. lechuquilla* (Gentry 1982: 296).

A. asperima ssp. asperima – **D**: USA (Texas), Mexico (Chihuahua, Coahuila, Nuevo León, Durango, Zacatecas); dry Chihuahuan Desert areas, 1200 - 1900 m. **I**: Gentry (1982: 276, 297-298, as *A. scabra*).

Incl. *Agave caeciliana* A. Berger (1915).

[2a] **Ros** rather open, 0.7 - 1 × to nearly 2 m, freely suckering; **L** 30 - 40, lanceolate, rigid, very broad at the base and constricted just above, long-acuminate, convex below, flat above, then deeply guttering through the middle of the lamina, scabrous, generally 60 - 110 × 12 - 16 cm, light green to glaucous-grey, margins sometimes horny along the upper ½; marginal teeth generally deflected below the middle of the lamina, larger teeth 8 - 15 mm, brown to pruinose-grey, on cusps from broadly rounded bases; terminal **Sp** subulate to acicular, very narrowly grooved above, base scabrous, 3.5 - 6 cm, long decurrent on the involute margin; **Inf** mostly 4 - 6 m, 'paniculate', part-**Inf** small, compact, 8 - 12 in the upper ⅓ of the **Inf**; **Fl** 60 - 80 mm; **Ov** slender, 30 - 40 mm, greenish; **Tep** yellow, tube 13 - 20 mm, lobes unequal, 18 - 25 mm. – *Cytology*: 2n = 128 - 186.

A. asperima ssp. maderensis (Gentry) B. Ullrich (Sida 15(2): 254, 1992). **T**: Mexico, Coahuila (Gentry & Engard 23251 [DES, MEXU, US]). – **D**: Mexico (Coahuila); local endemic in (limestone)

canyons of desert mountains, 1850 - 2000 m. **I:** Gentry (1982: 301, as *A. scabra* ssp.).

≡ *Agave scabra* ssp. *maderensis* Gentry (1982) (*incorrect name*, Art. 11.4).

[2a] Differs from ssp. *asperima*: Stem short, thick; **Ros** solitary; **L** triangularly linear-lanceolate, relatively smooth, 50 - 60 × 7 - 12 cm, green to yellow-green; marginal teeth slender, larger teeth 5 - 8 mm, mostly 2 - 3 cm apart; **Inf** with ≥ 12 large spreading several times compound part-**Inf**; **Fl** 65 - 70 mm; **Tep** tube 11 - 16 × 12 - 15 mm, lobes linear, 15 - 20 mm.

A. asperima ssp. *potosiensis* (Gentry) B. Ullrich (Sida 15(2): 254, 1992). **T:** Mexico, San Luis Potosí (Gentry & al. 20162 [US, DES, MEXU]). – **D:** Mexico (Nuevo León, San Luis Potosí, Querétaro); plains and hills of the S Chihuahuan Desert. **I:** Gentry (1982: 276, 301, as *A. scabra* ssp.).

≡ *Agave scabra* ssp. *potosiensis* Gentry (1982) (*incorrect name*, Art. 11.4).

[2a] Differs from ssp. *asperima*: **Ros** more open, spreading, sparingly surculose; **L** broadly lanceolate, tip outcurving and sigmoid, asperous to nearly smooth, 65 - 110 × 14 - 20 cm, glaucous-grey to nearly white, frequently cross-zoned; marginal teeth sometimes on tuberculate elevations; **Inf** with 10 - 18 small part-**Inf**; **Ov** slender, 32 - 50 mm; **Tep** tube large, 15 - 22 mm.

Best distinguished by its more open and spreading rosettes with broader leaves, flowers with slender ovaries and a large tube, but often difficult to separate due to apparent introgression with *A. americana* ssp. *protoamericana* (Gentry 1982: 301).

A. asperima ssp. *zarcensis* (Gentry) B. Ullrich (Sida 15(2): 254, 1992). **T:** Mexico, Durango (Gentry & Arguelles 22084 [US, DES, MEXU]). – **D:** Mexico (Durango). **I:** Gentry (1982: 276, 303, as *A. scabra* ssp.).

≡ *Agave scabra* ssp. *zarcensis* Gentry (1982) (*incorrect name*, Art. 11.4).

[2a] Differs from ssp. *asperima*: **Ros** surculose, forming large clumps; **L** linear-ovate, hollowed above, 55 - 60 × 15 - 20 cm, greyish-green; marginal teeth mostly reflexed, moderate, larger 5 - 7 mm, 1 - 2 cm apart; part-**Inf** 8 - 14, in the upper 1/3 of the **Inf**, on sigmoid **Br**; **Fl** 68 - 92 mm; **Ov** 3-angled and 6-grooved, 35 - 50 mm; **Tep** tube deeply furrowed, thickly 12-ridged within.

A highland ecotype within *A. asperima*, distinguished best by its short broad leaves with moderate teeth, large flowers, 2-level insertion of filaments, and large woody fruits (Gentry 1982: 302).

A. atrovirens Karwinsky ex Salm-Dyck (Hort. Dyck., 7: 302, 1834). **T** [neo]: Mexico, Oaxaca (Gentry 22377 [US, DES, MEXU]). – **D:** S Mexico.

A. atrovirens var. *atrovirens* – **D:** Mexico (Guerero, Puebla, Veracruz, Oaxaca); strictly high-montane, 1850 - 3400 m. **I:** Gentry (1982: 468, 471-472); Cact. Suc. Mex. 39(4): front cover, 1994.

Incl. *Agave tehuacanensis* Karwinsky ex Otto (1842); **incl.** *Agave latissima* Jacobi (1864); **incl.** *Agave schlechtendalii* Jacobi (1864); **incl.** *Agave coccinea* Roezl ex Jacobi (1865) ≡ *Agave americana* var. *coccinea* (Roezl ex Jacobi) A. Terracciano (1885); **incl.** *Agave ottonis* Jacobi (1866); **incl.** *Agave canartiana* Jacobi (1868); **incl.** *Agave canartiana* var. *laevior* Jacobi (1868); **incl.** *Agave deflexispina* Jacobi (1870); **incl.** *Agave gracilis* Jacobi (1870); **incl.** *Agave macroculmis* Todaro (1878); **incl.** *Agave coccinea* hort. ex A. Berger (1898) (*nom. illeg.*, Art. 53.1).

[2k] **Ros** openly spreading, large to very large, 1.5 - 2 × 3 - 4 m, solitary; **L** lanceolate, thick at the base (to 25 cm), usually narrowed below the middle of the lamina, openly concave, mostly 150 - 200 × 25 - 40 cm, dark to blackish-green to light glaucous or glaucous-variegated, margins ± straight; marginal teeth moderate, regular, bases broad, larger teeth mostly 4 - 7 mm (in the **L** middle), brown to greyish-brown, 1 - 4 cm apart; terminal **Sp** straight or sinuous, strong, broad at the base, widely openly grooved above, 3 - 5 cm, keel rounded below and markedly intruding into the **L** tip; **Inf** 8 - 12 m, 'paniculate', narrow, part-**Inf** congested in the upper 1/3 - 1/2 of the **Inf**, globose, mostly 18 - 30; **Fl** thickly fleshy, 70 - 100 mm; **Ov** cylindrical, tapering at the base, 30 - 50 mm, neck thick, furrowed, 4 - 7 mm; **Tep** red to purple in bud, when opening yellowish within, tube 11 - 15 mm, lobes unequal, outer 30 - 34 mm.

See Piña Luján (1994) on the type locality.

A. atrovirens var. *mirabilis* (Trelease) Gentry (Agaves Cont. North Amer., 473, ill. (p. 476), 1982). **T:** Mexico, Veracruz (Trelease 7 p.p. [MO, DES]). – **D:** Mexico (Puebla, Veracruz); cool montane habitats, 2150 - 2480 m.

≡ *Agave mirabilis* Trelease (1920).

[2k] Differs from var. *atrovirens*: **L** consistently light grey-glaucous.

A. attenuata Salm-Dyck (Hort. Dyck., 3, 1834). **T:** [neo - icono]: Curtis's Bot. Mag. ser. 3, 18: t. 5333, 1862. – **Lit:** Ullrich (1990h: with ill.). **D:** Mexico (Jalisco, Michoacán, México); high rocky outcrops in pine forests, 1900 - 2500 m. **I:** Gentry (1982: 67-68). **Fig. 1a**

Incl. *Agave attenuata* var. *brevifolia* Jacobi (s.a.); **incl.** *Agave attenuata* var. *latifolia* Salm-Dyck (s.a.); **incl.** *Agave elliptica* hort. ex Besaucèle (s.a.); **incl.** *Agave virens* hort. ex Besaucèle (s.a.); **incl.** *Agave spectabilis* hort. ex Besaucèle (s.a.) (*nom. illeg.*, Art. 53.1); **incl.** *Agave compacta* hort. ex Besaucèle (s.a.) (*nom. inval.*, Art. 32.1c?); **incl.** *Ghiesbreghtia mollis* Roezl (1861) (*nom. inval.*, Art.

32.1c?); **incl.** *Agave glaucescens* Hooker (1862) (*nom. illeg.*, Art. 53.1); **incl.** *Agave attenuata* var. *compacta* Jacobi (1865); **incl.** *Agave pruinosa* Lemaire ex Jacobi (1865); **incl.** *Agave debaryana* Jacobi (1868); **incl.** *Agave ghiesbreghtii* [?] *dentata* Hort. Belg. ex Jacobi (1868); **incl.** *Agave ghiesbreghtii* [?] *mollis* Hort. Belg. ex Jacobi (1868); **incl.** *Agave kellockii* Jacobi (1868); **incl.** *Agave dentata* hort. ex Baker (1877) (*nom. illeg.*, Art. 53.1); **incl.** *Agave attenuata* var. *serrulata* A. Terracciano (1885) $\equiv$ *Agave cernua* var. *serrulata* (A. Terracciano) A. Berger (1915); **incl.** *Agave cernua* A. Berger (1915).

[1b] Stems 1 to several, usually ascending-curved, 0.5 - 1.5 m, becoming naked in age; **L** indeterminate in number, relatively short-lived, ovate-acuminate, softly succulent, broadest in the middle, plane to concave, 50 - 70 $\times$ 12 - 16 cm, light glaucous-grey to pale yellowish-green, margins smooth or serrulate; terminal **Sp** absent but **L** tip finely tapered, soon fraying; **Inf** 2 - 3.5 m, 'spicate', densely flowered, part-**Inf** shortly pedicellate 'fascicles' with 3 - 8 **Fl** in the **Ax** of chartaceous **Bra**; **Fl** 35 - 50 mm; **Ov** fusiform, 15 - 25 mm, green, neck constricted; **Tep** greenish-yellow, tube shallowly funnel-shaped, 3 - 5 mm, lobes equal, 16 - 24 mm.

The presence of a flower tube groups this species in Group *Serrulatae* and not in Group *Choritepalae*, which includes the otherwise similar *A. bracteosa* and *A. ellemetiana*. It is closely related to *A. gilbertii* and esp. to *A. pedunculifera*, which form a broad-leaved group within Group *Serrulatae* (as *Amolae*) (Gentry 1982: 70).

A. aurea Brandegee (Proc. Calif. Acad. Sci., ser. 2, 2: 207, 1889). **T:** Mexico, Baja California (*Brandegee* s.n. [UC]). – **Lit:** Turner & al. (1995). **D:** Mexico (Baja California Sur); lava fields, mostly 300 - 1070 m. **I:** Gentry (1982: 310, 312, 314).

Incl. *Agave campaniflora* Trelease (1912).

[2d] Stem short; **Ros** rather open, 1 - 1.2 $\times$ 1.5 - 2 m, solitary; **L** linear to long-lanceolate, widely arching, pliable, guttered, rounded below, thickly fleshy towards the base, (63-) 86 (-110) $\times$ (7-) 8.6 (-12) cm, green to somewhat glaucous, margins straight to undulate; marginal teeth moderate, regular, mostly 4 - 7 mm, 1 - 2 cm apart, dark to light brown, on straight or moderately curved cusps from low angular bases; terminal **Sp** subulate, 2.5 - 3.5 cm, dark brown or greyish-red, shortly decurrent or decurrent as dark horny margin through the uppermost 8 - 10 teeth bases; **Inf** 2.5 - 5 m, 'paniculate', part-**Inf** broad, congested, 15 - 25, in the upper 1/2 of the **Inf**; **Fl** campanulate, 43 - 70 mm; **Ov** 25 - 35 mm, reddish, neck constricted, 6 - 10 mm; **Tep** red to purplish in bud, opening yellow to orange-yellow, tube 8 - 14 mm, lobes 16 - 19 mm.

Easily recognized by the long narrow lanceolate green leaves arching out in open rosettes, broad ra-

ther diffuse reddish lateral part-inflorescences, and bright yellow flowers from reddish buds and ovaries (Gentry 1982: 313).

A. avellanidens Trelease (Annual Rep. Missouri Bot. Gard. 22: 60, 1912). **T:** Mexico, Baja California (*Brandegee* 6 [UC]). – **D:** Mexico (Baja California). **I:** Gentry (1982: 361). **Fig. 1b**

[2h] Stem to 0.5 m; **Ros** 0.6 - 1.2 $\times$ 1 - 1.5 m, solitary; **L** many, broadly linear-lanceolate to ovate, thickly fleshy, rigid, little or not narrowed at the base, shortly acuminate, smooth, 40 - 70 $\times$ 9 - 14 cm, green, margins straight or undulate, frequently horny; marginal teeth straight or variously curved, variable in size and curvature, flattened, 5 - 15 mm, dusky grey over brown, mostly 1 - 3 cm apart, rather regularly spaced; terminal **Sp** conical, strong, 2.5 - 4.5 cm, brown to greyish, strongly decurrent as horny margin; **Inf** 4 - 6 m, 'paniculate', part-**Inf** dense, large, globose, 25 - 35; **Fl** small, slender, 40 - 70 mm; **Ov** 20 - 40 mm, neck sometimes constricted; **Tep** pale yellow, drying orange-yellow, tube 4 - 6 mm, lobes $\pm$ equal, 16 - 24 mm.

Resembling *A. shawii* (Group *Umbelliflorae*) within Group *Deserticolae*, from which it clearly differs in its flowers (Gentry 1982: 363).

A. bahamana Trelease (Mem. Nation. Acad. Sci. 11: 40, t. 84-86, 1913). **T:** Bahamas, Great Harbor Cay (*Britton & Millspaugh* 2340 [NY]). – **Lit:** Correll & Correll (1982). **D:** Bahamas (Berry Islands); open rocky plains and ridges, open coppices and pinelands.

Incl. *Agave sobolifera* Hitchcock (1893) (*nom. illeg.*, Art. 53.1); **incl.** *Agave rigida* Northrop (1902) (*nom. illeg.*, Art. 53.1).

[2n] Acaulescent; **Ros** solitary; **L** rather narrowly lanceolate, concave, occasionally somewhat conduplicate, 2 - 3 m $\times$ 15 cm, dull greyish, margins nearly straight; marginal teeth straight or the longer teeth appressed-recurved, triangular, scarcely lenticular at the base, 3 - 5 mm, usually 5 - 10 mm apart, reduced above and below, sometimes on small green tubercles; terminal **Sp** slightly recurved, stoutly conical, usually becoming involutely grooved below the middle, smooth, 1 - 1.5 cm, brownish becoming grey, dull, decurrent; **Inf** to $\pm$ 10 m, 'paniculate', ovoid, part-**Inf** on slightly ascending **Br**, $\pm$ in the upper 1/3 of the **Inf**; **Ped** $\pm$ 10 mm; **Fl** 50 - 60 mm; **Ov** oblong-fusiform, 30 - 35 mm; **Tep** $\pm$ 15 $\times$ 4 mm, golden-yellow, tube conical, $\pm$ 7 mm, lobes 15 mm; **Fr** oblong, shortly stipitate and beaked, 5 $\times$ 2.5 cm.

A. barbadensis Trelease (Mem. Nation. Acad. Sci. 11: 28-29, t. 34-38, 65, 107, 1913). – **Lit:** Howard & al. (1979). **D:** Lesser Antilles (Barbados); spontaneous in dune areas, frequently escaped from cultivation.

Incl. *Agave americana* Dillenius (1774) (*nom. il-*

leg., Art. 53.1); **incl.** *Furcraea tuberosa* Drummond (1907) (*nom. illeg.*, Art. 53.1).

[2o] **Ros** moderately surculose; **L** broadly lanceolate, curved outwards, up to 20 cm thick at the base, rather abruptly acute, almost cochleate and conduplicate towards the tip, concave, 150 - 250 × 25 - 30 (at the base) cm, dull dark green, glaucous when young, margins straight; marginal teeth straight or curved, distinct, 2 - 3 mm, usually 10 - 12 mm apart; terminal **Sp** rather unguiculately-conically subulate, involute at the base, smooth, polished near the tip, (0.7-) 1 - 1.5 cm, blackish-brown at the curved tip, decurrent and dorsally intruding into the green tissue; **Inf** 5 - 6 m and more, narrowly oblong, 'paniculate', part-**Inf** on very ascending **Br**, in the upper 1/3 or more of the **Inf**, freely and densely bulbilliferous, not known to produce **Fr**; **Ped** 10 (-20) mm; **Fl** aborting before completely opening, 65 - 75 mm and more; **Ov** oblong-fusiform, 45 - 55 mm; **Tep** yellow, tube conical, ± 15 mm, lobes 20 - 25 mm.

A. bicolor (Solano & García-Mendoza) Thiede & Eggli (KuaS 52: [in press], 2001). **T:** Mexico, Oaxaca (*García-Mendoza & al.* 2403 [MEXU, BRIT, FEZA]). – **D:** Mexico (Oaxaca); grassland and in pine-oak forests, 2300 - 2500 m, flowering July to August.

≡ *Polianthes bicolor* Solano & García-Mendoza (1998).

[3b2] Plants glabrous; rhizome (2-) 3 - 4 (-5) × (1-) 1.5 - 2.5 cm; **R** fleshy; **L** (3-) 4 - 6 (-12), lanceolate, semisucculent, undulate, (5-) 8 - 15 × 0.6 - 1 (-1.4) cm, smooth to papillose, margins undulate, papillose, hyaline; **Inf** 24 - 40 (-54) cm, 'spicate', with 3 - 5 (-9) **Fl**-bearing nodes with paired **Fl**; **Bra** lanceolate, 3 - 5 (-7.5) cm; **Ped** 6 - 13 mm, reddish; **Fl** (20-) 23 - 29 mm; **Ov** 9 - 15 (-19) mm; **Tep** orange-greenish, tube abruptly widened and curved, (1.6-) 2.4 - 3 (-5.5) mm Ø at the mouth, lobes 2 - 3 (-4) × (1.7-) 2 - 3 (-4) mm, green, apiculate; **Anth** included; **Sty** (10-) 19 - 26 (-32) mm; **Sti** 3-lobed; **Fr** semiglobose, 1.1 × 1.1 cm; **Se** semiglobose, 4.5 × 2.4 mm, black.

According to the protologue closest to *A. duplicata* (as *Polianthes geminiflora*). *A. bicolor* is the S-most species in the *Polianthes* Group.

A. ×blissii (Worsley) Thiede & Eggli (KuaS 50(5): 111, 1999). – **I:** Worsley (1911).

≡ *Polianthes ×blissii* Worsley (1911).

This is the garden hybrid *A. duplicata* (as *Bravoa geminiflora*) × *A. polianthes* (as *Polianthes tuberosa*).

A. boldinghiana Trelease (Mem. Nation. Acad. Sci. 11: 21, t. 11-13, 1913). **T:** Curaçao (*Boldingh* A2 [not indicated]). – **Lit:** Hummelinck (1938). **D:** Leeward Islands (Aruba, Bonaire, Curaçao). **I:** Hummelinck (1993).

[2q] Stem almost none; **Ros** suckering; **L** narrowly oblanceolate, subacuminate, openly concave, 90 - 125 × ± 15 cm, green, passing into somewhat glaucous, margins rather straight; marginal teeth often irregularly upcurved above and recurved below, heavily triangular or from lunate bases, mostly 2 - 5 mm, scarlet becoming chestnut-brown, mostly 1 - 1.5 cm apart; terminal **Sp** acicular, somewhat upcurved-flexuous, grooved and usually involute towards the base, smooth, polished towards the tip, 2.5 - 3 cm, red-brown, shortly decurrent; **Inf** ± 5 m, 'paniculate', narrowly oblong, part-**Inf** few, distant, on ascending **Br**, in the upper 1/2 or less of the **Inf**, freely bulbilliferous; **Ped** 5 mm; **Fl** 45 mm; **Ov** broadly fusiform, 20 - 25 mm; **Tep** golden-yellow, tube conical, ± 7 mm, lobes 15 mm; **Fr** unknown.

Always distinguishable from all other species in its geographical range, but less well defined compared with certain forms of *A. cocui* and *A. vicina* (as *A. vivipara*) from other regions (Hummelinck 1938).

A. bovicornuta Gentry (Publ. Carnegie Inst. Washington 527: 92, 1942). **T:** Mexico, Sonora (*Gentry* 3672 [DS, ARIZ, DES]). – **D:** Mexico (Sonora, Chihuahua, Sinaloa); rocky open slopes, oak woodland and pine-oak forest, 930 - 1850 m. **I:** Gentry (1982: 325, 330). **Fig. I.c, I.e**

[2c] **Ros** 0.8 - 1 × 1.5 - 2 m, solitary; **L** lanceolate to spatulate, much narrowed towards the base, widest at or above the middle, smooth, 60 - 80 × 14 - 17 cm, yellowish-green to green, younger **L** frequently shining glaucous, with conspicuous imprints from the central bud, margins crenate; marginal teeth dimorphic, larger teeth mostly 8 - 12 mm, flexuous and slender above a broad base, mostly 2 - 4 cm apart, on prominent tubercles, smaller teeth mostly 2 - 5 mm, 1 to several between the larger teeth, all chestnut-brown or dark brown to greyish-brown in age; terminal **Sp** strong; **Inf** 5 - 7 m, 'paniculate', narrow, scape short, part-**Inf** short, compact, 20 - 30 in the upper 1/2 of the **Inf**; **Fl** small, 55 - 65 mm; **Ov** 30 - 35 mm incl. a neck 4 - 6 mm long, pale green; **Tep** yellow, tube 6 - 8 mm, lobes 18 - 21 mm.

Distinguished within Group *Crenatae* by light to yellowish-green leaves with narrow bases, relatively small flowers, and the low insertion of the filaments in the middle of the perianth tube (Gentry 1982: 330).

A. braceana Trelease (Mem. Nation. Acad. Sci. 11: 40, t. 83, 1913). **T:** Bahamas (*Brace* 1982 [NY]). – **Lit:** Correll & Correll (1982). **D:** Bahamas (Abaco); rocky or sandy soils in pinelands or coastal coppices.

Incl. *Agave mexicana* Dolley & al. (1889) (*nom. illeg.*, Art. 53.1).

[2n] Acaulescent; **Ros** solitary; **L** broadly oblanceolate, nearly flat, to ± 70 × 20 cm, grey, margins between the teeth straight or concave when the

teeth are raised on low green tubercles; marginal teeth straight or the lower teeth gently recurved, triangular, 2 - 3 mm, usually 5 - 10 mm apart; terminal **Sp** conical, straight or gently curved, flat or round-grooved to about the middle or becoming involute, smooth, 1 - 1.5 cm, brownish becoming grey, dull, slightly decurrent; **Inf** to ± 7 m, 'paniculate'; **Ped** ± 10 mm; **Fl** 40 - 45 mm; **Ov** oblong-fusiform, 20 mm; **Tep** 15 - 17 $\times$ 3 - 4 mm, golden-yellow, tube conical, ± 7 mm, lobes 15 - 17 mm; **Fr** broadly oblong, shortly stipitate and beaked, 2 - 3.5 $\times$ 2 cm.

A. bracteosa S. Watson *ex* Engelmann (Gard. Chron., ser. nov. 18: 776, ill., 1882). **T**: [lecto - icono]: l.c. figs. 138-139. - **D**: Mexico (Coahuila, Nuevo León); scattered on limestone cliffs and rocky slopes of the N Sierra Madre Oriental, 900 - 1700 m. **I**: Gentry (1982: 90, 92). **Fig. 1d**

[1c] **Ros** open, small to medium-sized, forming caespitose mounds by above-ground axillary budding; **L** relatively few, long-lanceolate, arching and recurving, with weak fibres, widest near the base, convex in the basal $\frac{1}{4}$, plane above, asperous, 50 - 70 $\times$ 3 - 5 cm, yellow-green, margins minutely serrulate; terminal **Sp** absent, leaf tip drying early, friable, yellowish; **Inf** ascending to erect, 1.2 - 1.7 m, 'spicate', densely flowered in the upper $\frac{1}{4}$, part-**Inf** with geminate **Fl**; **Fl** 22 - 26 mm; **Ov** fusiform, 12 - 14 mm, virtually neckless; **Tep** white to pale yellow, tube virtually none, reduced to a short **Rec**, lobes 11 mm; **Fil** long-exserted, 50 - 60 mm.

Very distinctive, even within the Group *Choritepalae*, with its unarmed curling leaves and white flowers (Gentry 1982: 91). This prompted Ullrich (1990b) to place it within a reconsidered monotypic Group *Serrulatae* Baker (see also the note for *A. brevispina*). Gentry (l.c.) reports the inflorescences to emerge laterally from upper leaf axils so that one rosette may flower repeatedly. This atypical behaviour may simply be a misinterpretation, with the flowering rosettes merely forming rosettes from upper leaf axils after flowering. - The neotypification by Gentry (1982: 91) is superseded by Ullrich (l.c.).

A. brevipetala Trelease (RSN 23: 362, 1927). **T**: Hispaniola, Haiti (*Ekman* 1604 [MO?]). - **D**: Hispaniola (Haiti: Morne Cabaio, La Selle).

[2?] Acaulescent; **Ros** solitary; **L** broadly lanceolate, 100 cm, green, rather dull; marginal teeth broadly triangular, variously curved, with lenticular bases, 5 - 10 mm but apical and basal teeth smaller, glossy chestnut-brown, 10 - 15 mm apart, teeth of the middle of the **L** on clasping green marginal prominences, margin in-between nearly straight; terminal **Sp** smooth, curved, subterete, involutely narrow-grooved, 20 - 25 $\times$ 6 mm, rather glossy chestnut-brown, decurrent for some 10 cm and connecting to the small upper teeth; **Inf** 'paniculate', **Fl** densely clustered at the tips of the part-**Inf**,

not known to be bulbiferous; **Ped** ± 5 mm; **Fl** ± 35 mm; **Ov** thick, oblong, 20 mm, longer than the **Tep**; **Tep** colour not described, drying dark, lobes 10 mm; **Fr** unknown.

Described on the base of the dried type material only and apparently not mentioned by any later author. See also the note for *A. brevispina*.

A. brevispina Trelease (RSN 23: 363, 1927). **T**: Hispaniola, Haiti (*Ekman* 5371 [MO?]). - **D**: Hispaniola (Haiti: Croix-des-Bouquets, Plaine Cul de Sac).

[2?] Acaulescent; **Ros** solitary; **L** broadly lanceolate, 100 $\times$ 10 cm, dark green, rather dull; marginal teeth straight or some of the lower teeth recurved, rather narrowly triangular, with lenticular base, 1 - 3 mm, 5 - 15 mm apart, margin in-between nearly straight; terminal **Sp** straight, somewhat flattened, involutely narrowly grooved, slightly granular, 10 $\times$ 3 mm, rather dull hazel-brown, tip darker, decurrent for 2 $\times$ its length; **Inf** 4 m, 'paniculate', part-**Inf** rather slender, shortly few-flowered at the tips and **Fl** densely clustered, not known to be bulbiferous; **Ped** ± 5 mm; **Fl** ± 40 mm; **Ov** 25 mm, longer than the **Tep**; **Tep** yellow, tube 5 mm, lobes 12 $\times$ 5 mm; **Fr** unknown.

Described on the base of the type material only and apparently not mentioned by any later author. This and the aforementioned species do not fit well into any of the groups established by Trelease. They are of uncertain affinities and in need of study. Trelease himself did not give further data in the protologues.

A. brittoniana Trelease (Mem. Nation. Acad. Sci. 11: 44-45, t. 98-99, 1913). **T**: Cuba, Santa Clara (*Britton & al.* 4776 [NY]). - **Lit**: Álvarez de Zayas (1996b). **D**: C Cuba.

A polymorphic species, which occurs abundantly and prolifically at anthropogenic sites (Álvarez de Zayas l.c.).

A. brittoniana ssp. **brachypus** (Trelease) A. Álvarez (Fontqueria 44: 121, 1996). **T**: Cuba (*Britton & al.* 6183 [NY?]). - **D**: C Cuba; xeromorphic scrub and derived secondary formations. **I**: Trelease (1913: t. 99: 1, as var.).

$\equiv$ *Agave brittoniana* var. *brachypus* Trelease (1913).

[2m] Differs from ssp. *brittoniana*: **L** tip canalicate, normally with small denticles at the inner margin; **Inf** somewhat laxer; **Fl** smaller; **Fr** more cylindrical.

The shorter pedicels given as diagnostic in the protologue are not a constant feature (Álvarez de Zayas l.c.).

The basionym could be regarded as a provisional and hence invalid (Art. 34.1b) name, but Trelease's illustration and the adjacent caption leaves no doubt

that he fully accepted the taxon. The lectotypification proposed by Álvarez de Zayas (l.c.) is unnecessary and moreover erroneous, since an element not originally included by Trelease is selected.

A. brittoniana ssp. **brittoniana** – **D:** C Cuba; evergreen forests to xeromorphic scrub, 100 - 1000 m.

[2m] Stems not rhizomatous; **L** broadly lanceolate, abruptly acute towards the tip, (70-) 80 - 100 (-110) × (13-) 15 - 20 (-24) cm, green, sometimes somewhat greyish, slightly glossy, margins often concave; marginal teeth variously curved, 1 - 6 (-8) mm, (6-) 8 - 10 (-15) mm apart, slender-cusped from lenticular or heavy bases, which may stand on retrorse green prominences in the lower 1/3 of the **L**; terminal **Sp** unguiculate curved, subconical or involutely much thickened below, openly grooved to the middle or involute, smooth, somewhat polished, 1 - 2.5 cm, brown, dotted with white, ± decurrent; **Inf** (4-) 5 - 8 m, 'paniculate', scape very short or nearly none, part-**Inf** ascending, (11-) 15 - 30 cm; **Ped** 5 - 10 mm; **Fl** 25 - 35 (-45) mm; **Ov** fusiform, 15 - 20 (-25) mm; **Tep** yellow, outer face greenish, tube open, 3 - 6 mm, lobes 9 - 14 (-16) × 3 - 5 mm; **Fr** oblong, sometimes nearly cylindrical, basally strongly stipitate, tip slightly beaked, 2.3 - 4 (-4.5) × 1.1 - 1.5 (-1.7) cm.

A. brittoniana ssp. **sancti-spirituensis** A. Álvarez (Fontqueria 44: 125, ill. (p. 122), 1996). **T:** Cuba, Sancti Spiritus (Jiménez & al. 69532 [HAJB]). – **D:** C Cuba.

[2m] Differs from ssp. *brittoniana*: **L** much smaller, more broadly oblong and less lanceolate; **Fl** as well as **Tep** and **Anth** larger.

A. brunnea S. Watson (Proc. Amer. Acad. Arts 26: 156, 1891). **T:** Mexico, Coahuila (Pringle 2218 [GH, US [photo]]). – **D:** Mexico (SE Chihuahua, W Coahuila); dry hills or desert plains, volcanic or alluvial alkaline soils (sandy or gravelly clay), 1125 - 1400 m, flowering late June to August. **I:** Piña Luján (1985: 28-29).

≡ *Manfreda brunnea* (S. Watson) Rose (1903) ≡ *Polianthes brunnea* (S. Watson) Shinnars (1966).

[3a1] Plants robust, reproducing vegetatively by buds from the rhizome below the **L** bases; rhizome usually oblong, ± 2 × 0.9 - 2.5 cm; **R** fleshy; **L** 4 - 8, succulent, recurved, linear-lanceolate to broadly lanceolate, tip acute, with a long point, smooth, to 32 × 1.3 - 2.9 (-3.6) cm, somewhat glaucous, mottled with red; margins toothed, teeth cartilaginous, usually large, deltoid or truncate-erose, 0.3 - 1.1 cm apart, with narrow pale band on the **L** margin between the teeth; remains of **L** bases membranous, fraying into fine fibres at the tip, (4.5-) 5.5 - 9.5 cm; **Inf** to 1.3 m, 'spicate', flowering part 6.5 - 29 cm, with 9 - 29 solitary sessile, nearly erect **Fl**; **Ov**

long-ellipsoid, 10 - 20 (-23) mm; **Tep** tube narrowly funnel-shaped, straight, gradually constricted above the **Ov**, (15-) 20 - 32 (-35) mm, outer face yellowish-green, inner face brown; **Tep** lobes obtuse, not swollen at the tip; **Sty** exceeding the **Tep** tube for 35 - 53 (-65) mm; **Sti** clavate, trigonous, deeply furrowed; **Fr** woody, ellipsoid to oblong, 1.8 - 3.6 × 1.2 - 1.6 cm; **Se** 5 × 3 - 4 mm. – *Cytology*: n = 30.

Easily distinguished from the other species in the *A. brunnea* Subgroup by its long narrow tepal tube with exerted stamens and styles and by the coarse teeth on the leaf margin (Verhoek-Williams 1975: 190).

A. bulliana (Baker) Thiede & Eggli (KuaS 50(5): 112, 1999). **T:** Mexico (Karwinsky s.n. [not preserved]). – **D:** Mexico (Durango, Aguascalientes, Jalisco, Nayarit, Michoacán, Zacatecas); dry rocky slopes or roadcuts, in pine-oak grassland, or in shaded moist ravines, 1150 - 3100 m, flowers late June to early September. **I:** CBM 121: pl. 7427, 1895; McVaugh (1989: fig. 41, as *Prochnyanthes mexicana*).

≡ *Bravoa bulliana* Baker (1884) ≡ *Prochnyanthes bulliana* (Baker) Baker (1895); **incl.** *Polianthes mexicana* Zuccarini (1837) ≡ *Prochnyanthes mexicana* (Zuccarini) Rose (1903); **incl.** *Prochnyanthes viridescens* S. Watson (1887).

[3c] Plants large (for Subgen. *Manfreda*), usually single; **R** semifleshy with a wiry core, rhizomes cylindrical, 1 - 3 × 1.5 - 2.5 cm; **L** few, (1-) 2 - 4 (-5), chartaceous, thin, fibrous, erect or occasionally curved backwards from about the middle, often twisted, with a distinct midrib, shallowly channelled over the midrib, lamina flat, broadly undulate, or revolute, linear-lanceolate to oblanceolate, narrowed towards the base, 20 - 47 (-62) × (0.7-) 1.3 - 5.2 (-6.9) cm, light or dark green, dull, often speckled with magenta towards the base, spotted or not, veins slightly prominent on both surfaces, papillate, fibres of old **L** bases 7 - 10 (-12.5) cm, margins very narrow, hyaline, papillate to erose-papillate or papillate-denticulate; **Inf** 0.9 - 2 m and more, 'spicate', flowering part elongate, (9-) 17.5 - 47 (-83.5) cm, with 4 - 22 flowering nodes with paired **Fl**; **Ped** 3 - 46 (-68) mm; **Fl** functionally pendent by an abrupt curve in the **Tep** tube; **Ov** ellipsoid, 4 - 8 (-12) mm; **Tep** white tinged with grey-green or dull green and red, white or creamy within, tube curved near the middle or at 1/3 from the **Ov**, narrow below, abruptly widened above the bend, (11-) 15 - 27 mm, lobes flaring, broadly deltoid, (3-) 4 - 9 (-10) mm; **Sty** finally equalling the tube or longer, white; **Fr** 1 - 1.9 × 1 - 1.4 cm; **Se** 2.5 - 3 × 3.5 - 4 mm.

When transferring *Prochnyanthes mexicana* to *Agave*, a new name was necessary to avoid homonymy with *A. mexicana* Lamarck 1783. Therefore, the second-oldest synonym *Prochnyanthes bulliana* had to be chosen.

A. ×bundrantii (Howard) Thiede & Eggli (KuaS 50(5): 111, 1999).

≡ *Polianthes ×bundrantii* Howard (1978).

This is the garden hybrid *A. polianthes* (as *Polianthes tuberosa*) × *A. howardii* (as *Polianthes howardii*).

A. cacozela Trelease (Mem. Nation. Acad. Sci. 11: 41, t. 89-91, 1913). **T:** Bahamas, New Providence (*Cunningham* s.n. [MO?]). – **D:** Bahamas (New Providence); rocky margins of salt marshes.

[2n] Acaulescent; **Ros** solitary; **L** lanceolate, deeply concave, typically roughish, 150 - 200 × 20 cm, yellowish-green, somewhat overcast with grey, margins straight or somewhat concave between the teeth; marginal teeth nearly straight or the larger teeth appressed-recurved, narrowly triangular, 2 - 5 mm (middle of the lamina), usually 1 - 1.5 cm apart; terminal **Sp** triquetrously conical, straight or the tip slightly refracted, openly grooved below the middle, smooth, 1.5 - 2 cm, brownish becoming grey, dull, decurrent; **Inf** 6 - 7 m, 'paniculate', dense, ovoid, part-**Inf** on horizontal or slightly ascending **Br**, reportedly sometimes bulbiferous; **Ped** ± 10 mm; **Fl** 50 - 60 mm; **Ov** oblong-fusiform, 35 - 40 mm; **Tep** ± 20 × 4 - 5 mm, golden-yellow, tube rather open, ± 7 mm; **Fr** narrowly oblong, shortly conical-stipitate, 3.5 - 4.5 × 1.5 cm.

According to the protologue, seedlings of the type collection were decidedly papillate-roughened on both leaf faces.

A. cajalbanensis A. Álvarez (Revista Jard. Bot. Nac. Univ. Habana 1(2/3): 33-39, ill., 1981). **T:** Cuba, Pinar del Río (*Bisse & Álvarez* 32466 [HAJB]). – **D:** W Cuba; steep ultrabasic slopes.

[2l] Stem short; **Ros** solitary; **L** many, oblanceolate in the lower 2/3, straight, fleshy, coriaceous, only slightly concave, 50 - 60 × 8 - 10 cm, grey-green, slightly opaque, margins with asymmetrical slightly recurved prominences, these 3 × 4 - 5 mm, in between margin nearly straight; marginal teeth basally slightly recurving, 2 - 4 mm, dark chestnut-brown to nearly black, 1 - 2 cm apart; terminal **Sp** conical, straight, basally flattened, 1 - 1.5 cm, dark chestnut-brown, not lustrous, not decurrent; **Inf** 3 - 5 m, 'paniculate', part-**Inf** 3-parted, 30 - 40 cm; **Ped** 18 - 25 (-35) mm; **Fl** 40 - 45 mm; **Ov** fusiform, trigonous, basally constricted, 15 - 20 mm; **Tep** orange, slightly yellow, tube 5 - 6 mm, lobes 12 - 15 mm; **Fr** oblong, apically acute or apiculate, 2 - 2.5 × 1.5 cm.

Easily identifiable by its somewhat lobed leaf margins, the recurved marginal teeth, its orange flowers and small fruits. It is closest to *A. grisea*, but the leaves and inflorescences are only 1/2 as large according to the protologue.

A. calodonta A. Berger (Hort. Mortol. 364, 1912). **T:** Ex cult. La Mortola (*Berger* s.n. [US [lecto?]]).

– **D:** Only known from cultivation. **I:** Gentry (1982: 334).

Incl. *Agave scolymus* A. Berger (1898) (*nom. illeg.*, Art. 53.1).

[2c] **Ros** semiglobose, 1.5 - 1.6 m Ø, solitary; **L** many, spatulate, ± erect, older **L** spreading, fleshy, narrowed towards the base (7.5 - 8 cm), shortly acuminate, basally convex on both faces, upper face shallowly hollowed, upwards markedly thin, ≥ 80 × 20 - 21 (upper 1/3) cm, light green, with light grey bloom, both faces with imprints of the central bud, margins sinuous in the middle of the lamina; marginal teeth irregular, 10 - 13 mm, 2.5 - 3.5 cm apart, with broad horny bases and deltoid cusps hooked forwards or backwards, on broad fleshy prominences, intersinuses with much smaller intermittent teeth, teeth in the lower 1/2 of the **L** much smaller, straight or reflexed, all teeth light brown; terminal **Sp** 3 - 4 cm, decurrent to the upper 3 - 4 teeth; **Inf** tall, 'paniculate', long pyramidal, scape strong; **Fl** 85 mm (dried); **Ov** narrow, 35 - 40 mm; **Tep** yellow, tube broadly funnel-shaped, ± 10 mm, lobes 35 - 40 mm.

The only plant known up to now flowered in La Mortola in 1897 and died without producing seed or offsets (Berger 1915: 196).

A. cantala Roxburgh (Hort. Bengal., 25, 1814). – **D:** Known from cultivation only.

≡ *Furcraea cantala* (Roxburgh) Voigt (1845); **incl.** *Agave cantula* Roxburgh (1832) (*nom. inval.*, Art. 61.1).

A. cantala var. **acuispina** (Trelease) Gentry (Agaves Cont. North Amer., 569, ill. (p. 555), 1982). **T:** El Salvador, San Miguel Dept. (*Calderón* 2084 [US]). – **D:** Known from cultivation only (S Mexico, Honduras, El Salvador).

≡ *Agave acuispina* Trelease (1925).

[2f] Differs from var. *cantala*: **L** sturdier, shorter, mature **L** 140 - 170 × 6 - 8 cm, margins straight to undulate; terminal **Sp** 3 - 5 mm broad at the base, longer, > 1.5 cm; **Inf** with 20 - 35 part-**Inf**; **Fl** shorter, 57 - 63 mm; **Ov** shorter, 25 - 30 mm, neck short; **Tep** green, lobes subequal, 19 - 21 mm, light greenish-yellow.

A. cantala var. **cantala** – **Lit:** McVaugh (1989). **D:** Cultivated worldwide, esp. in SE Asia; not known from the wild. **I:** Gentry (1982: 570).

Incl. *Agave bulbifera* Salm-Dyck (1834); **incl.** *Agave laxa* Karwinsky ex Otto (1842) (*nom. illeg.*, Art. 53.1); **incl.** *Agave vivipara* Dalzell & A. Gibson (1861) (*nom. illeg.*, Art. 53.1); **incl.** *Agave rumphii* Jacobi (1865) (*nom. illeg.*, Art. 53.1); **incl.** *Agave candelabrum* Todaro (1878).

[2f] Stem 30 - 60 cm; **Ros** tall, slender, laxly leafy, 2 - 2.5 m Ø, surculose; **L** linear, long-acuminate, thin, frequently reflexing, roundly keeled below towards the base, rough below, smooth above,

150 - 200 × 7 - 9 cm, light or dark green, margins straight; marginal teeth antrorsely curved, small, larger teeth 3 - 4 mm, brown, mostly 2 - 3 cm apart, reduced or lacking towards the **L** tip; terminal **Sp** very small, 0.5 - 1.5 cm; **Inf** 6 - 8 m, 'paniculate', scape slender, part-**Inf** lax, ± 20, in the upper ½ of the **Inf**, sometimes bulbiferous; **Fl** slender, 70 - 85 mm; **Ov** fusiform, tapering below to a basal rim, 32 - 42 mm, virtually neckless; **Tep** greenish tinged purple or reddish, tube 14 - 17 mm, lobes subequal, 25 - 28 mm.

Recognizable by its thin long narrow leaves (weak and frequently reflexed above the middle), small teeth and green flowers in broad 'panicles' (Gentry 1982: 569).

A. capensis Gentry (Occas. Pap. Calif. Acad. Sci. 130: 72-73, ill. (pp. 74-76), 1978). **T:** Mexico, Baja California Sur (Gentry & Fox 11247 [US]). – **D:** Mexico (Baja California Sur); arid slopes, ± sea-level to ± 3200 m. **I:** Gentry (1982: 310, 317-318).

[2d] Stem short; **Ros** open, small, caespitose by axillary budding, eventually in large clusters 0.6 - 0.8 × 0.8 - 1.2 m; **L** narrowly lanceolate, straight to arching, soft, brittle, succulent, commonly sigmoid towards the tip, convex below, concave above, mostly 30 - 60 × 4 - 7 cm, light glaucous-green, margins undulate, not horny; marginal teeth mildly curved, regular, 4 - 5 mm, reddish-brown to greyish, mostly 1 - 2 cm apart, with short mamillate bases; terminal **Sp** subulate, 1.5 - 3 cm, dark brown, shortly decurrent for 1 - 2 cm; **Inf** mostly 2.5 - 3.5 m, 'paniculate', part-**Inf** small, 15 - 24, in the upper ½ - ⅔ of the **Inf**; **Fl** 50 - 65 mm; **Ov** 25 - 35 mm, green, neck constricted; **Tep** in bud reddish-brown or purplish, opening yellow outside, tube 8 - 14 mm, lobes equal, 13 - 23 mm. – *Cytology*: 2n = 60.

Distinguished within the Group *Campaniflorae* by its small narrow leaves and clustered growth (Gentry 1982: 316).

A. caribaeicola Trelease (Mem. Nation. Acad. Sci. 11: 27, t. 30, 1913). **T:** Martinique (*Hahn* 114 [NY, MO?]). – **Lit:** Howard & al. (1979: with ill.). **D:** Windward Islands (Dominica, Martinique, St. Lucia, St. Vincent, Grenadines, Grenada). **I:** KuaS 48: 98, as *A. unguiculata*.

Incl. *Agave martiana* C. Koch (1860); **incl.** *Agave caribaea* Baker (1888) (*nom. illeg.*, Art. 53.1); **incl.** *Agave grenadina* Trelease (1913); **incl.** *Agave medioxima* Trelease (1913); **incl.** *Agave unguiculata* Trelease (1913); **incl.** *Agave ventum-versa* Trelease (1913).

[2o] **Ros** solitary; **L** lanceolate, ascending, curving and twisted, rather gradually and very concavely acute, 100 - 200 × 15 cm, green and glossy, very slightly glaucous beneath, margins straight; marginal teeth straight, 1 - 3 mm, or those below the middle of the lamina 2× as long and recurved, narrowly triangular, red to chestnut-brown, ± 5 mm

apart, commonly with intermediate smaller intermittent teeth; terminal **Sp** conical and grooved or involute, recurved-mucronate or with oblong-conical involute light brown basal thickening, smooth, 1.5 - 2.5 cm, nearly black, rather dull, decurrent, dorsally intruding into the green **L** tissue; **Inf** 3 - 5 m, 'paniculate', bulbiferous, not known to produce **Fr**; **Fl** ± 60 mm; **Tep** golden-yellow, tube openly conical, 8 mm, lobes 18 - 20 mm.

Berger (1915: 216) regards *A. martiana* as possibly very close to *A. medioxima* and *A. grenadina* (both here included as synonyms); it would antedate *A. caribaeicola* and its definite identification is open to debate.

A. cerulata Trelease (Annual Rep. Missouri Bot. Gard. 22: 55, 1912). **T:** Mexico, Baja California (*Nelson & Goldman* 7180 [US]). – **Lit:** Turner & al. (1995). **D:** Mexico (Baja California).

A. cerulata ssp. *cerulata* – **D:** Mexico (C and S Baja California, N Baja California Sur). **I:** Gentry (1982: 356, 364).

[2h] **Ros** small, 0.2 - 0.5 m, abundantly surculose; **L** few, narrowly lanceolate to triangular-lanceolate, long-acuminate, mostly 25 - 50 × 4 - 7 cm and 6 - 12× as long as broad, yellow to light green, sometimes cross-zoned, rarely light glaucous-grey, margins nearly straight to mildly undulate; marginal teeth small, weakly attached, 1 - 4 mm, greyish-brown, bordered with a brown ring at the base, irregularly spaced, on low tubercles, sometimes lacking through much of the lamina; terminal **Sp** acicular, 3 - 6 cm, light to dark grey, decurrent only to the uppermost teeth or less; **Inf** 2 - 3.5 m, 'paniculate', part-**Inf** small, 6 - 12; **Fl** mostly 45 - 60 mm; **Ov** fusiform, 22 - 32 mm; **Tep** in bud white waxy glaucous, opening pale yellow, tube broadly funnel-shaped or discoid, with thick **Nec** and bulges opposite the **Fl** insertions, 3 - 5 mm, lobes 16 - 22 mm.

A. cerulata ssp. *dentiens* (Trelease) Gentry (Occas. Pap. Calif. Acad. Sci. 130: 43, 1978). **T:** Mexico, Baja California (*Rose* 16819 [MO, US]). – **D:** Mexico (Baja California: San Esteban Island).

≡ *Agave dentiens* Trelease (1912).

[2h] Differs from ssp. *cerulata*: **Ros** 0.5 - 0.7 × 0.8 - 1.5 m; **L** long-acuminate, 40 - 55 (-70) cm, light glaucous grey, margins nearly straight to mildly undulate; marginal teeth small, weakly attached, friable, 1 - 2 mm, or nearly toothless; terminal **Sp** acicular, 3 - 5 cm, brown to grey; **Inf** broad, part-**Inf** 8 - 18 in the upper ½ of the **Inf**, on 30 - 40 cm long **Br**.

A. cerulata ssp. *nelsonii* (Trelease) Gentry (Occas. Pap. Calif. Acad. Sci. 130: 44, 1978). **T:** Mexico, Baja California (*Nelson & Goldman* 7111 [US]). – **D:** Mexico (C Baja California); igneous highlands. **I:** Gentry (1982: 356, 372-373). **Fig. II.b**

≡ *Agave nelsonii* Trelease (1912); **incl.** *Agave shawii* E. C. Nelson (1911) (*nom. illeg.*, Art. 53.1).

[2h] Differs from ssp. *cerulata*: **Ros** 0.5 - 0.75 m Ø; **L** short-acuminate, 20 - 40 × 6 - 8 cm, mostly 3 - 6× as long as broad, mostly light grey to bluish-glaucous over green, margins undulate with small prominences or nearly straight; marginal teeth firmly attached, larger, 3 - 9 mm, frequently on small tubercles; terminal **Sp** strongly subulate, 2 - 4 cm; **Inf** with 15 - 20 part-**Inf**.

A. cerulata ssp. *subcerulata* Gentry (Occas. Pap. Calif. Acad. Sci. 130: 44-48, ills. (pp. 46-47, 49), 1978). **T**: Mexico, Baja California Sur (Gentry 10330 [US, DES, MEXU]). – **D**: Mexico (N Baja California Sur). **I**: Gentry (1982: 356, 373). **Fig. II.c**

[2h] Differs from ssp. *cerulata*: **Ros** 0.15 - 0.3 × 0.3 - 0.5 m; **L** short-acuminate, 15 - 30 × 2.5 - 7 cm, mostly 3 - 6× as long as broad, mostly light grey to bluish-glaucous over green, margins conspicuously crenate with prominent tubercles; marginal teeth well developed, weakly attached, larger, 3 - 8 mm in the middle of the lamina; terminal **Sp** subulate, usually sinuous, 2 - 4 cm.

Resembles *A. subsimplex* from the opposite Sonoran coast (Gentry 1982: 375).

A. chamelensis (E. J. Lott & Verhoek-Williams) Thiede & Egli (KuaS 50(5): 110, 1999). **T**: Mexico (Lott & Wendt 1663 [MICH, BH, CAS, MEXU]). – **D**: Mexico (Jalisco); uncommon along arroyos in tropical (semi-) deciduous forests, 50 - 75 m, flowers in December. **I**: Lott & Verhoek-Williams (1991: as *Manfreda*).

≡ *Manfreda chamelensis* E. J. Lott & Verhoek-Williams (1991).

[3a2] Plants reproducing vegetatively by buds from the rhizome; **R** fleshy; rhizome upright, cylindrical, 3 - 15 × 2 - 3 cm; **L** up to 9, spreading, narrowly channelled, nearly conduplicate near the base, base narrow, tip acute, brittle, herbaceous to somewhat fleshy, veins papillate on both faces, 37 - 77 (-91) × (1-) 1.6 - 4.8 (-6.5) cm, margins with a narrow yellowish cartilaginous band, minutely denticulate, teeth regular; remains of **L** bases membranous, not separating into fibres; **Inf** 0.75 - 1.2 (-2) m, 'spicate', flowering part 10 - 20 cm, with 10 - 25 (-35) sessile **Fl**; mature **Fl** nearly erect; **Ov** oblong to ovate, not protruding into the tube, 5 - 10 mm; **Tep** green, tube funnel-shaped, 6 - 13 mm, lobes oblong, reflexed to tightly revolute, 8 - 11 mm; **Sty** 25 - 35 mm exserted; **Sti** clavate, trigonous; **Fr** globose, 1.2 - 1.6 × 1 - 1.5 cm; **Se** ± cuneiform, 5 - 6 × 4 - 5 mm.

This species appears to be closest to *A. scabra* and *A. jaliscana*. It differs from both by shorter floral bracts, filaments curved near the tip at bud opening, and by the absence of coarse fibrous remains of old leaves, from the first-named by its shorter floral

tube and globose beakless capsules, and from the last-named by its wider leaves and shorter styles and filaments (Lott & Verhoek-Williams 1991). The tropical lowland habitat is untypical and apparently not known for any other species of Subgen. *Manfreda* except *A. littoralis*.

A. chiapensis Jacobi (Hamburg. Gart.- & Blumenzeit. 22: 213, 1866). **T** [neo]: Mexico, Chiapas (Gentry 12178 [US, DES, MEXU, MICH]). – **D**: Mexico (Chiapas). **I**: Gentry (1982: 217, 225).

Incl. *Agave chiapensis* var. *major* hort. ex A. Berger (1915); **incl.** *Agave teopiscana* Matuda (1974).

[1f] Stem short; **Ros** openly spreading, robust, medium-sized, caespitose; **L** variable, ovate, narrowed near the base, shortly acuminate, rounded below, plane to slightly hollowed above and up-curving, smooth, mostly 30 - 50 × 7 - 16 cm, light shiny grey-green, margins slightly undulate to crenate; larger marginal teeth deltoid, upcurved, 3 - 4 mm, closely spaced, or more remote and subulate, 5 - 10 mm, dark brown to greying; terminal **Sp** subulate, straight to sinuous, strong, 2 - 3.5 cm; **Inf** ± 2 m, 'spicate', with a long scape, **Fl** in the terminal ¼ - ½; **Fl** trigonous, fleshy, 60 - 70 mm, obscured in large tufts of broad-based **Bra**; **Ov** grooved to the base, 20 - 30 mm; **Tep** yellow or green flushed with reddish or purple, tube funnel-shaped, 8 - 12 mm, lobes unequal, 30 - 32 mm.

Appears to be closely related to *A. warelliana*, which differs in its closely serrate marginal teeth on a red margin (Gentry 1982: 226).

A. chrysantha Peebles (Proc. Biol. Soc. Wash. 48(4): 139, 1935). **T**: USA, Arizona (Peebles & Harrison 5543 [US]). – **Lit**: Turner & al. (1995). **D**: USA (C Arizona); granitic and volcanic mountain slopes, 900 - 1800 m. **I**: Gentry (1982: 421, 426-427).

≡ *Agave palmeri* var. *chrysantha* (Peebles) Little ex Benson (1943) ≡ *Agave palmeri* ssp. *chrysantha* (Peebles) B. Ullrich (1992).

[2g] **Ros** small and compact to rather large and open, 0.5 - 1 × 0.8 - 1.8 m, usually solitary; **L** linear-lanceolate to lanceolate, straight, usually only a little narrowed below the middle, widest in the middle, deeply guttered, mostly 40 - 75 × 8 - 10 cm, greyish to yellowish-green, margins nearly straight to repand; larger marginal teeth straight or flexed, 5 - 10 mm, ± 1 - 3 cm apart, smaller towards the base and with small intermittent teeth; terminal **Sp** slender, openly grooved above, 2.5 - 4.5 cm, brown or castaneous to grey in age, decurrent for 5 - 15 cm to the upper teeth; **Inf** 4 - 7 m, 'paniculate', small, narrow, part-**Inf** small, congested, 8 - 18 in the upper ¼ - ½ of the **Inf**; **Fl** 40 - 55 mm; **Ov** slender, 22 - 30 mm, neck short, constricted; **Tep** yellow, rarely red-tipped, tube 8 - 13 mm, lobes dimorphic, outer 9 - 15 mm. – *Cytology*: 2n = 60.

Benson (1943) and Ullrich (1992e) both suggest

infraspecific ranks under its closest largely allopatric relative *A. palmeri*, with which it shows introgression where they meet (Gentry 1982: 429, 446). The species hybridizes with *A. murpheyi*, *A. palmieri*, *A. parryi* var. *couesii* and *A. delamateri* (Hodgson 1999).

A. chrysoglossa I. M. Johnston (Proc. Calif. Acad. Sci., Ser. 4, 12: 998-999, 1924). **T:** Mexico, Baja California (Johnston 3123 [CAS]). – **Lit:** Turner & al. (1995). **D:** Mexico (Sonora); on often bare rocks in hot coastal and lowland regions. **I:** Gentry (1982: 67, 73). **Fig. II.d**

[1b] Stem short; **Ros** openly spreading, 1 - 1.3 × 2 - 2.4 m, mostly solitary, sometimes suckering profusely; **L** few, linear-lanceolate, straight or slightly curved, deflexed at maturity, convex below, flat above, smooth, 70 - 120 × 4 - 7 cm (wider at the base), light green, margins fragile, 1 mm wide, brown; marginal teeth none; terminal **Sp** acicular, with a short fine groove at the base above, 2 - 4 cm, brown, aging greyish; **Inf** mostly 2 - 4 m, 'spicate', densely flowered in the upper ¼, part-**Inf** with geminate **Fl**; **Ped** bifurcate, 10 - 15 mm; **Fl** 35 - 45 mm; **Ov** slender, 16 - 20 mm incl. a 3 - 5 mm long neck; **Tep** yellow, tube shallow, 4 - 4.5 mm, lobes ± equal, outcurved at anthesis, 14 - 16 mm.

Closely related to *A. vilmoriniana*, but with straight narrow plane leaves and without bulbils in the inflorescence. It represents the xerophytic northern coastal / lowland relative of the Group *Serrulatae* (as *Amolae*) (Gentry 1982: 74-75).

A. cocui Trelease (Mem. Nation. Acad. Sci. 11: 19, t. 5-7, 1913). **T:** Venezuela (*Zuloaga* s.n. [MO?]). – **Lit:** Hummelinck (1936). **D:** Venezuela, Colombia; mainly coastal; also on the Leeward Islands (Aruba, Bonaire, Curaçao, Margarita), probably introduced. **I:** Hummelinck (1993).

Incl. *Agave americana* Humboldt (1808) (*nom. illeg.*, Art. 53.1); **incl.** *Agave cocui* var. *cucutensis* Hummelinck (1936); **incl.** *Agave cocui* var. *laguayrensis* Hummelinck (1936).

[2q] **Ros** solitary; **L** broadly lanceolate, guttered, sharply acute or subacuminate, deeply and sometimes tortuously concave, (80-) 100 - 120 (-140) × ± 30 cm, glaucous, soon green and glossy, margins concave; marginal teeth mostly upcurved above and recurved below, acuminate triangular or from lunate bases on green or at length hardening prominences, 2.5 - 6 mm, reddish chestnut-brown, usually 10 - 20 mm apart; terminal **Sp** triquetrously conical, shallowly grooved below the middle and involute below, smooth, (1-) 1.2 - 2 (-3) cm, red-brown, decurrent and dorsally immersed into the green tissue; **Inf** 5 - 10 m, 'paniculate', narrowly oblong, part-**Inf** on nearly horizontal **Br**; **Fl** 40 - 65 mm; **Ov** 25 - 40 mm; **Tep** yellow, tube openly conical, 3 - 7 mm, lobes ± 18 - 25 mm; **Fr** oblong, little stipitate or beaked, 4 - 5 × 1.7 - 2.5 cm.

Not always clearly separated from *A. vicina* (as *A. vivipara*) (Hummelinck 1938).

A. colimana Gentry (CSJA 40: 212-213, ill., 1968). **T:** Mexico, Colima (Gentry 18325 [US, DES, MEXU]). – **Lit:** McVaugh (1989). **D:** Mexico (SW Jalisco, Colima, Michoacán); primarily coastal on rocky sites, or more inland in tropical deciduous forest, 0 - 1000 m. **I:** Gentry (1982: 104, 107-108).

Incl. *Agave ortgiesiana* Roezl (1871); **incl.** *Agave angustissima* var. *ortgiesiana* Trelease (1920).

[1d] Shortly caulescent; **Ros** 0.4 - 0.6 × 1 - 1.2 m, solitary; **L** many, linear, straight, slightly narrowed above the base, widest near the middle, thin and flat above, smooth, 40 - 70 × 1 - 2.5 cm, green, margins narrow, brown, filiferous with fine long brown threads; terminal **Sp** weak, short, 5 - 8 mm, greyish-brown to dark brown, decurrent into the **L** margin; **Inf** 2 - 3 m, 'spicate', slender, flowering from ± 1 m above the base, part-**Inf** not crowded, with geminate **Fl**; **Ped** 10 - 15 mm; **Fl** 40 - 50 mm; **Ov** 14 - 20 mm, greenish-yellow, neck 4 - 7 mm, slightly constricted; **Tep** pale yellow or lavender, tube narrow, 9 - 17 mm, lobes nearly equal, 14 - 19 mm.

Distinctive with its elongate leaves and deep narrow flower tube, but sometimes approaching *A. filifera* ssp. *schidigera* in flower tube length and *A. filifera* ssp. *multifilifera* in leaf characters (Gentry 1982: 103). Gentry (l.c.) and also McVaugh (1989: 135) regard the earlier name *A. ortgiesiana* as invalid but referring to the same species. *A. ortgiesiana* was published in an excerpt of a letter, and if the name must be regarded as valid, as advocated by Ullrich (1991a), *A. colimana* should be formally proposed for conservation.

A. colorata Gentry (Publ. Carnegie Inst. Washington 527: 93, 1942). **T:** Mexico, Sonora (Gentry 3050 [CAS, ARIZ]). – **Lit:** Turner & al. (1995). **D:** Mexico (Sonora, N Sinaloa); foothills or coastal regions, open rocky sites in thorn forest. **I:** Gentry (1982: 421, 432); KuaS 44(10): centre page pullout 1993/10. **Fig. I.f**

[2g] **Ros** compact, small to medium-sized, sparingly suckering; **L** few, ovate, shortly acuminate to lanceolate, thick, firm, convex below towards the base, plane to concave above, asperous, 25 - 60 × 12 - 18 cm, light grey, glaucous, frequently cross-zoned and red-tinted, margins prominently crenate or mamillate; marginal teeth straight or flexuous, mostly 5 - 10 mm (in the middle of the lamina), brown to greyish, 1.5 - 3 cm apart, smaller below; terminal **Sp** subulate, straight or flexuous, narrowly grooved above in the upper ½, mostly 3 - 5 cm, brown to grey; **Inf** 2 - 3 m, 'paniculate', narrow, part-**Inf** densely flowered, 15 - 20 in the upper ⅓ - ½ of the **Inf**; **Fl** 50 - 70 mm; **Ov** 25 - 40 mm, pale green, neck short, not constricted; **Tep** reddish in bud, opening yellow, apex usually remaining red-

dish, tube 15 - 20 mm, lobes unequal, outer 12 - 16 mm.

The closest relative, both morphologically and geographically, is *A. shrevei* (Gentry 1982: 431).

A. confertiflora Thiede & Eggli (KuaS 50(5): 111, 1999). **T:** Mexico, Chihuahua (*Hartman* 536 [US?]). – **D:** Mexico (Chihuahua).

Incl. *Bravoa densiflora* B. L. Robinson & Fernald (1895) $\equiv$ *Pseudobravoa densiflora* (B. L. Robinson & Fernald) Rose (1899) $\equiv$ *Polianthes densiflora* (B. L. Robinson & Fernald) Shinnars (1966).

[3b2] **R** numerous, spreading, thickened; stem bulb-like, oblong, to $5 \times \geq 2.5$ cm; **L** linear, attenuate, 7.5 - 10 $\times$ 0.25 cm, scape **L** reduced to **Bra**, 2.5 - 5 cm, with broad scarious and attenuate tips, floral **Bra** similar; **Inf** 'spicate', short, dense; **Fl** solitary, slender, spreading, curved, 43 - 55 mm; **Tep** pulverulent-tomentose on the outer face, dull yellow (dry), tube scarcely widened, throat oblique, lobes erect, ovate, obtuse, with a tuft of short white **Ha** at the tip, 2.5 - 4 mm; **Fr** (immature) ovoid, ≥ 0.5 cm $\emptyset$; **Se** unknown.

A hardly known but seemingly very distinct species, apparently known only from the type collection. When *Polianthes densiflora* is transferred to *Agave*, a new name is necessary to avoid homonymy with *A. densiflora* Hooker.

A. congesta Gentry (Agaves Cont. North Amer., 476-479, ill., 1982). **T:** Mexico, Chiapas (Gentry 23651 [US, DES, MEXU]). – **D:** Mexico (Chiapas); widely scattered in pine-oak forest, 2150 - 2480 m.

[2k] Stem short; **Ros** compact, to $1 \times 1 - 2$ m, solitary; **L** lanceolate to lanceolate-spatulate, at first curved-ascending, then horizontally spreading, thick, (shortly) acuminate, plane, (40-) 70 - 120 $\times$ 10 - 22 cm, green to yellow-green, sometimes faintly glaucous or pruinose; margins undulate to crenate, variously mamillate; marginal teeth straight to variously curved, moderate to rather large, dark to greyish-brown, usually remote, 3 - 5 cm apart, mostly on cusps, 5 - 10 mm, base broad and low; terminal **Sp** stout, base very broad, widely flatly grooved above, 3 - 7 cm, grey to chestnut-brown, sharply decurrent to the upper teeth; **Inf** 6 - 8 m, 'paniculate', straight, part-**Inf** as congested rounded clusters, 40 - 50 per **Inf**; **Fl** 55 - 70 mm; **Ov** 30 - 40 mm, neck short; **Tep** orange to reddish or purplish, opening yellow, tube deeply funnel-shaped, 10 - 13 mm, lobes unequal, 17 - 25 mm.

The closely related *A. hiemiflora* is distinguished by its smaller rosettes with fewer leaves and less congested flowers with less dimorphic and paler tepals (Gentry 1982: 479).

A. cundinamaricensis A. Berger (Agaven, 222, 1915). **T:** Colombia, Cundinamarca (*Wercklé* s.n. [not indicated]). – **D:** Colombia (Cundinamarca: Río Magdalena drainage).

[2o?] **Ros** solitary; **L** very thick above the base, only 15 cm broad, straightly spreading, then curved upwards and rapidly becoming broader, then again curved outwards, but the last 15 cm again curved upwards, 200 $\times$ 45 cm, steel-grey on yellowish-green ground; marginal teeth flat and broad, nearly obtuse, very short, hardly pungent; terminal **Sp** rather short; **Inf** 'paniculate', part-**Inf** sparingly bulbiferous.

Hardly known and possibly a redescription of the first species described from Colombia, *A. wallisii*. Berger (1915) placed both species in his Ser. *Colombianae*, which he regards as possibly closest to the *Caribaeae*. Neither of these 2 species appears close to the geographically adjacent Colombian-Venezuelan *A. cocui* from Group *Vicinae*.

A. cupreata Trelease & A. Berger (Agaven, 197, 1915). **T:** Mexico, Michoacán / Guerrero (*Langlassé* 867 [B [status?], MEXU, US]). – **D:** Mexico (Michoacán, Guerrero); mountain slopes, 1220 - 1850 m. **I:** Gentry (1982: 325, 336-337). **Fig. II.f**

[2c] **Ros** caulescent, openly spreading, medium-sized, solitary; **L** broadly lanceolate or ovate, thick-fleshy, strongly narrowed at the base, plane to slightly concave above, 40 - 80 $\times$ 18 - 20 cm, bright shiny green, margins deeply crenate-mamillate; marginal teeth straight to curved, strongly flattened, dimorphic, larger teeth 10 - 15 mm on prominences, 3 - 6 cm apart, smaller teeth in the intersinuses of the **L** margin, of varying sizes, copper-coloured to grey; terminal **Sp** slender, sinuous, 3 - 5 cm, light brown to greyish, with a sharp border decurrent to the upper teeth; **Inf** 4 - 7 m, 'paniculate', rather broad, part-**Inf** lax, diffuse, 14 - 25 in the upper $\frac{1}{2}$ of the **Inf**; **Fl** 55 - 60 mm; **Ov** 30 - 35 mm, olive-green, neck constricted; **Tep** rufous in bud, open orange-yellow, tube broadly funnel-shaped, 6 - 7 mm, lobes subequal, 20 - 21 mm.

Distinguished by the broad, shiny green leaves with high prominences and conspicuous patterns from the central bud, which are bright copper-coloured in early stages (Gentry 1982: 335).

A. dasylirioides Jacobi & Bouché (Hamburg. Gart.- & Blumenzeit. 21: 344, 1865). **T:** "Guatemala" (*Warszewicz* s.n. [B]). – **Lit:** Ullrich (1990g: with ill.). **D:** Mexico (San Luis Potosí, Morelos); cliffs on mountain slopes, mixed pine and hardwood forest, 1500 - 2200 m. **I:** Gentry (1982: 236, 240-241).

Incl. *Agave dealbata* Lemaire ex Jacobi (1865) $\equiv$ *Agave dasylirioides* var. *dealbata* (Lemaire ex Jacobi) Baker (1877); **incl.** *Agave intrepida* Greenman (1899).

[1a] **Ros** symmetrical, 0.3 - 0.5 $\times$ 0.6 - 1 m, generally solitary; **L** 70 - 100, linear-lanceolate, straightly spreading but pliable, relatively thin, scarcely succulent, plane above, mostly 40 - 60 $\times$ 2 - 3 cm, glaucous-green, smoothly striate below and above, margins 1 mm wide, pale yellowish-white,

minutely serrulate; terminal **Sp** acicular, 0.5 - 1.5 cm, reddish-brown; **Inf** 1.5 - 2 m, 'spicate', arching, with **Fl** in the upper $\frac{1}{3}$ - $\frac{1}{2}$, part-**Inf** with 1 - 2 **Fl**; **Fl** persistent; **Ov** linear-tapered, 9 - 12 mm, neckless; **Tep** greenish-yellow, tube funnel-shaped, 8 - 12 mm, lobes equal, 9 - 11 mm.

The type of this name was erroneously said to have been collected in Guatemala. Gentry (1982: 241) assumed this species to hold a very basal position in the genus based on its 'primitive' features (leaves serrulate and scarcely succulent, inflorescences relatively simple, ovary incompletely inferior, tepals all equal, lobes nearly of equal length), and this assumption is principally confirmed by molecular data (Bogler & Simpson 1996). See also the comment for *A. petrophila*.

A. datylio Simon *ex* F. A. C. Weber (Bull. Mus. Hist. Nat. (Paris) 8: 224, 1902). **T** [neo]: Mexico, Baja California (*Gentry & Arguelles* 11200 [US, DES, MEXU, MICH]). - **Lit**: Turner & al. (1995). **D**: Mexico (Baja California Sur).

Without close relatives in Group *Vivipara* (as *Rigidae*) (Gentry 1982: 572).

A. datylio var. **datylio** - **D**: Mexico (Baja California Sur: Cape region); granitic sandy soils at lower elevations. **I**: Gentry (1982: 571).

[2f] **Ros** 0.6 - 1 × 1 - 1.5 m, suckering freely, rhizomes frequently elongate; **L** radiately spreading, lanceolate-linear, rather rigid, rounded below, canaliculate above, 50 - 80 × 3 - 4 cm, green to yellowish-green, young somewhat glaucous, margins nearly straight; marginal teeth deltoid, flattened, rather blunt, mostly 3 - 5 mm, dark brown, usually remote or 3 - 6 cm apart, more closely spaced below; terminal **Sp** conical to subulate, scarcely or flatly grooved above, large, 2.5 - 4 cm, dark brown to greyish, shortly decurrent; **Inf** 3 - 5 m, 'paniculate', part-**Inf** small, 8 - 15 in the upper $\frac{1}{2}$ of the **Inf**; **Fl** 40 - 55 mm; **Ov** 20 - 30 mm; **Tep** greenish-yellow, tube funnel-shaped, 5 - 10 mm, lobes 15 - 20 mm.

A. datylio var. **vexans** (Trelease) I. M. Johnston (Proc. Calif. Acad. Sci., Ser. 4, 12: 1001, 1924). - **D**: Mexico (Baja California Sur); sandy soils at lower elevations. **I**: Gentry (1982: 572).

≡ *Agave vexans* Trelace (1912).

[2f] Differs from var. *datylio*: **Ros** smaller; **L** smaller, 30 - 50 cm, more glaucous or yellowish. - *Cytology*: 2n = 174.

This appears to represent the xerophytic ecotype of the species (Gentry 1982: 572).

A. debilis A. Berger (Agaven, 33, 1915). **T** [lecto]: Mexico, Oaxaca (*Pringle* 4745 [US, BM, BR, G, GH, LE, M, MEXU, PJ]). - **Lit**: McVaugh (1989). **D**: Mexico (D.F., Hidalgo, México, Morelos, Michoacán, Oaxaca, Puebla); moist pine forests or

pine-oak ericaceous woods, 1830 - 3960 m, flowers mid-July to mid-September.

Incl. *Manfreda angustifolia* Rose *in sched.* (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Manfreda pringlei* Rose (1903); **incl.** *Polianthes debilis* Shinnars (1966).

[3a3] Plants of moderate size (for Subgen. *Manfreda*), reproducing vegetatively by horizontal rhizomes with plantlets at the tips; rhizome cylindrical or rarely ovoid, (1-) 2 - 4 × 1.3 - 2 cm; **R** half-fleshy, fibrous, vertical; **L** 2 - 6 (-8), erect-spreading, linear-lanceolate, somewhat succulent, slightly channelled, occasionally gently undulate, tip acute, with medium-sized point, smooth, 14 - 56 × 0.8 - 2.2 (-2.8) cm, dark green, sometimes spotted, at times red-speckled on the lower face near the base, margins narrow, hyaline, sometimes streaked with purplish-red, papillate to erose-denticulate, usually rough to the touch; remains of the **L** bases fibrous, 4 - 9 cm; **Inf** (28-) 91.3 - 135 (-149) cm, 'spicate', flowering part short, crowded, 2.5 - 7.5 (-11) cm, with 5 - 18 sessile **Fl**; **Fl** nearly erect, slightly curved at the junction of **Ov** and **Tep** tube; **Ov** ellipsoid, 9 - 11 (-12) mm; **Tep** tube cylindrical, slightly widened towards the mouth, not constricted above the **Ov**, 9 - 15 × 3 - 5 (in the middle) mm; **Tep** lobes oblong, revolute, 8 - 13 (-16) mm, green or purple; **Sty** exerted for 30 - 48 mm; **Sti** clavate, trigonous, shallowly furrowed; **Fr** globose, 1.5 - 1.8 × 1.3 - 1.7 cm; **Se** 3 - 4 × 4 - 5 mm.

This species shares many floral and fruit characters with *A. guttata*, but is nevertheless easily distinguished by its longer, narrower and more pliable and herbaceous leaves and its distribution. It may represent the moist-forest counterpart of the more xeromorphic *A. guttata* (Verhoek-Williams 1975: 252-253).

A. decipiens Baker (BMI 1892: 183, 1892). **T**: [neo - icono]: Curtis's Bot. Mag. 122: t. 7477, 1896, sub *A. laxifolia*. - **D**: USA (Florida); coastal sands. **I**: Gentry (1982: 555, 574).

Incl. *Agave laxifolia* Baker (1896); **incl.** *Agave spiralis* Brandegee *ex* A. Berger (1912).

[2f] Arborescent, trunk 1 - 3 m, very broad through bulging **L** bases; **Ros** extending down for some distance from the stem tip; **L** narrowly lanceolate, rigidly spreading to recurving, fleshy, narrowed at the thickened base, long-acuminate, concave, mostly 75 - 100 × 7 - 10 cm, green, margins repand; marginal teeth 2 - 3 mm (in the middle of the lamina), dark brown, 1 - 2 cm apart, on low prominences, slender cusps upcurving, with few smaller intermittent teeth; terminal **Sp** conical, ungrooved, 1 - 2 cm, dark brown, not decurrent; **Inf** 3 - 5 m, 'paniculate', part-**Inf** 10 - 12 and more in the upper $\frac{1}{2}$ of the **Inf**, often bulbiferous; **Fl** 60 - 80 mm, foetid; **Ov** large and thick, 40 - 48 mm, neckless; **Tep** greenish-yellow, tube funnel-shaped, 11 - 13 mm, lobes subequal, 18 - 22 mm.

Geographically isolated from the remainder of the genus (except *A. neglecta*). The taxon is most probably of cultivated origin. It was reported to occur on old Indian village sites in 1933 and may well represent an old pre-Columbian food or fibre plant, comparable to *A. delamateri*. It is said to reach 4 m in height with leaves 2 m long in fertile soil (Gentry 1982: 573).

A. delamateri W. C. Hodgson & Slauson (Hasteltonia 3: 130-140, ill., 1995). **T:** USA, Arizona (Hodgson 5478 [DES, ASU]). – **D:** USA (C Arizona); open steep slopes, 725 - 1550 m. **I:** Hodgson (1999).

Incl. *Agave repanda* Trelease *ex* Gentry (1982) (*nom. inval.*, Art. 34.1c).

[2g] **Ros** $\pm 1 \times 1$ m, caespitose; **L** lanceolate, erect, broadest near or just below the middle, acuminate, inwardly arcuate at the tip, guttered above, mostly 50 - 63 (-74) $\times$ 7.5 - 9 cm, bluish-grey glaucous with purple-maroon tinge and green cross-banding, margins straight to repand; marginal teeth variable, usually reflexed, becoming porrect near the **L** base, larger teeth 3.5 - 5 mm, smaller teeth 1 - 1.5 mm, dark glossy brown to grey and pruinose (esp. towards the tip), 1.5 (near the **L** base) - 11 (-40) mm apart; terminal **Sp** 2.8 - 3.5 (-4.9) cm, brownish-grey, decurrent for $\frac{1}{6}$ - $\frac{1}{5}$ of the **L** length; **Inf** 4.5 - 6 m, 'paniculate', broad, open, part-**Inf** widely spaced, 12 - 17 in the upper $\frac{3}{5}$ - $\frac{5}{8}$ of the **Inf**, with 14 - 20 **Fl** each; **Fl** long-lived, 47 - 67 mm; **Ov** 21 - 29 mm, neck 1 - 3.5 mm; **Tep** pale cream tinged light green, tube 11 - 16 mm, lobes unequal, 14 - 18 mm.

According to the protologue already collected around 1920 and recognized as distinct by Trelease who used the unpublished name *A. repanda*. It is most closely related to the allopatric *A. fortiflora* and *A. palmeri*, but distinguished esp. by its numerous rhizomatous offsets, easily cut leaves, and 1- (instead of 2-) seriate filaments. It hybridizes with *A. chrysantha* (Hodgson 1999).

A. delamateri is regarded as a pre-Columbian food or fibre plant that originated farther S in Mexico since it occurs in direct or indirect association with archaeological features (cf. protologue). A further such (undescribed) taxon from the Grand Canyon region in Arizona is mentioned by Hodgson (1999).

A. deserti Engelm (Trans. Acad. Sci. St. Louis 3: 310-311, 370, 1875). **T** [syn]: USA, California (Emory s.n. [MO]). – **Lit:** Turner & al. (1995). **D:** SW USA, NW Mexico.

A large and variable complex with hard-to-define limits, and difficult to separate from *A. cerulata* (Gentry 1982: 376). *A. aquariensis* Trelease *ex* Gentry 1970 is either a synonym of *A. deserti* or of *A. subsimplex* (Gentry 1982: 390).

A. deserti ssp. **deserti** – **D:** USA (Arizona), Mexico (Baja California). **I:** Gentry (1982: 356, 377-378). **Fig. II.a, II.e**

Incl. *Agave deserti* Orcutt (1883) (*nom. illeg.*, Art. 53.1); **incl.** *Agave consociata* Trelease (1912).

[2h] **Ros** mostly 30 - 50 $\times$ 40 - 60 cm, sparingly or prolifically suckering; **L** variable, lanceolate to linear-lanceolate, thick, rigid, scarcely narrowed above the broad clasping base, moderately acuminate, convex below, concave above, mostly 25 - 40 $\times$ 6 - 8 cm, 4 - 7 $\times$ as long as broad, grey to bluish-glaucous, often cross-zoned, margins usually straight; marginal teeth usually regularly spaced, loosely attached, smaller teeth 2 - 3 mm, longer teeth 6 - 8 mm, grey, mostly 15 - 30 mm apart, slender-cusped; terminal **Sp** strong, generally 2 - 4 cm, light brown to greyish, decurrent to the 1. or 2. tooth; **Inf** 2.5 - 4 m, 'paniculate', part-**Inf** small, 6 - 15 in the upper $\frac{1}{5}$ - $\frac{1}{4}$ of the **Inf**; **Fl** 40 - 60 mm; **Ov** 22 - 40 mm, neck slightly narrowed, 4 - 6 mm; **Tep** yellow, tube 4 - 6 mm, lined with a nectariferous disk, lobes equal, 14 - 20 mm. – *Cytology*: 2n = 118.

A. deserti ssp. **pringlei** (Engelmann *ex* Orcutt) Gentry (Occas. Pap. Calif. Acad. Sci. 130: 20, 1978). **T:** Mexico, Baja California Sur (Orcutt s.n. [K, MEXU]). – **D:** Mexico (Baja California). **I:** Gentry (1982: 378, 381).

$\equiv$ *Agave pringlei* Engelmann *ex* Orcutt (1883); **incl.** *Agave scaberrima* Hort. Peacock *ex* Baker (1888).

[2h] Differs from ssp. *deserti*: **Ros** 40 - 70 $\times$ 50 - 80 cm; **L** very long-acuminate, mostly 40 - 70 $\times$ 5 - 7 cm, 8 - 12 $\times$ as long as broad, green to yellowish-green or light glaucous-grey, margins straight; marginal teeth firmly attached; terminal **Sp** acicular, 3 - 4 cm, conspicuously decurrent in a horny margin frequently extending to the middle of the lamina or even below; **Inf** 3 - 6 m; **Tep** tube 5 - 8 mm.

Gentry (1982: 380) wrongly ascribes the basionym name to 'Engelmann *ex* Baker'.

A. deserti ssp. **simplex** Gentry (Occas. Pap. Calif. Acad. Sci. 130: 22, ill., pp. 23-24, 1978). **T:** USA, Arizona (Gentry 23404 [US, ARIZ, DES, MEXU]). – **D:** USA (Arizona, California), Mexico (Sonora); low desert scrub, 350 - 1200 m. **I:** Gentry (1982: 356, 383-384). **Fig. II.g**

[2h] Differs from ssp. *deserti*: **Ros** generally solitary, rarely with 1 - 3 offsets; **L** moderately acuminate, mostly 25 - 40 (-50) $\times$ 6.5 - 10 cm, 4 - 7 $\times$ as long as broad, margins usually straight; marginal teeth weakly attached; terminal **Sp** decurrent as a horny margin only to the 1. or 2. tooth; **Inf** 4 - 6 m; **Tep** in bud pale yellow to ferruginous, tube 5 - 10 mm.

Hybridizing with *A. schottii* ssp. *schottii*, and possibly with *A. mckelveyana* (Hodgson 1999).

A. desmetiana Jacobi (Hamburg. Gart.- & Blumenzeit. 22: 217, fig. 32, 1866). **T** [neo]: Mexico, Sinaloa (Gentry 11569 [US, DES, MEXU]). – **D**: Cultivated only. **I**: Gentry (1982: 621, 623-624).

Incl. *Agave regeliana* Jacobi (1866) $\equiv$ *Agave miradorensis* var. *regeliana* (Jacobi) A. Terracciano (1885) (*incorrect name*, Art. 11.1); **incl.** *Agave ananassoides* Jacobi (1868); **incl.** *Agave miradorensis* Jacobi (1868).

[2?] **Ros** 70 $\times$ 90 cm, surculose when young; **L** linear-lanceolate, arching, openly ascending, turgidly brittle, abruptly or gradually narrowed towards the base, 50 - 80 $\times$ 7 - 12 cm, dark to glaucous-green, margins smooth, without distinct coloration; marginal teeth none or small, regular, 1 - 2 mm, chestnut-brown, 1 - 2 cm apart or few and irregularly spaced; terminal **Sp** subulate, shortly and broadly grooved above, 2 - 3 cm, dark brown to reddish-brown; **Inf** 2.5 - 3 m, 'paniculate', long, narrow, part-**Inf** congested, 20 - 25 in the upper $\frac{1}{2}$ - $\frac{2}{3}$ of the **Inf**; **Fl** 40 - 60 mm; **Ov** shortly stipitate, small, 15 - 26 mm, green, neck very short, not constricted; **Tep** green in bud, open pale yellow, tube 10 - 12 mm, lobes 13 - 15 mm.

Distinguished by its smooth unarmed arching leaves and the short compact inflorescences with small flowers with a very short ovary and a broad tube (Gentry 1982: 623). It was originally introduced from Cuba as *A. anomala*, where it indeed may have originated (Ullrich 1990d). Its systematic position is unclear, since it does not fit well into any group; Gentry's placement in the former Group *Sisalanae* is regarded as artificial (Ullrich l.c.).

A. difformis A. Berger (Agaven, 95-96, 1915). **T**: US, K. – **D**: Mexico (San Luis Potosí, Hidalgo); coarse limestone rocky soils, arid side of the Sierra Madre Oriental, 1560 - 1875 m. **I**: Gentry (1982: 137-138).

[1g] **Ros** subcaulescent, open, rather vigorous, variable, 0.7 - 1 $\times$ 1 - 1.5 m, freely suckering; **L** polymorphic, straight or falcate or sinuous, stiffly ascending, thickly convex below, concave above, 50 - 80 $\times$ 4 - 6 cm, green to yellow-green, margins straight or undulate, firm or detachable, predominantly light grey; marginal teeth variable, generally 5 - 10 mm, dark brown to grey, 2 - 3 cm apart, rarely double, sometimes with smaller intermittent teeth, or reduced or entirely lacking; terminal **Sp** conical-subulate, stout, 1.5 - 3 cm, dark brown to grey; **Inf** 3.5 - 5 m, 'spicate', slender, scape waxy-glaucous, **Fl** in the upper $\frac{1}{3}$ - $\frac{1}{2}$ of the **Inf**; **Fl** 30 - 40 mm; **Ov** 15 - 21 mm, green, neck short; **Tep** light green to yellow and pink, tube 2.5 - 3.5 mm, lobes equal, 15 - 18 mm.

A robust species, within the Group *Marginatae* characterized by its polymorphic long-ensiform leaves (Gentry 1982: 137).

A. dolichantha Thiede & Eggli (KuaS 50(5): 111,

1999). **T**: Mexico, Jalisco (*Rose & Hay* 6290 [US]). – **D**: Mexico (Jalisco). **I**: Cházaro Basáñez & Machuca Núñez (1995: as *Polianthes longiflora*).

Incl. *Polianthes longiflora* Rose (1903).

[3b1] Plants glabrous; basal (= **Ros**) **L** unknown, tips of the bulb-**Sc** coarsely fibrous; **Inf** 'spicate', perhaps 1 m tall, with 2 - 8 **Fl** in 2 - 4 pairs well separated along the axis, or 2 - 4 **Fl** in an apical 'cluster', scape somewhat red-spotted; **Fl** sessile, fragrant at anthesis; **Ov** 9 - 16 (-19) mm; **Tep** pink in bud, at anthesis white or tinged with purple, tube 60 - 100 mm, basal portion erect or nearly so, narrowly tubular, 2 mm $\varnothing$, gradually funnel-shaped and dilated in the distal $\frac{1}{2}$ or $\frac{1}{3}$, curved outwards at or above the middle, mouth oblique, lobes elliptic, 15 - 20 (-26) mm; **Anth** tips scarcely surpassing the **Tep** tube; **Sty** 80 - 100 mm, lobes not exerted, flat, $\pm$ 1.5 mm; **Fr** unknown.

This species was long known only from incomplete flowering specimens offered for sale (McVaugh 1989: 253) until its recent discovery in the wild, see Cedano M. & al. (1993) and Cházaro Basáñez & Machuca Núñez (1995). Placed in *Agave*, a new name was necessary to avoid homonymy with *A. longiflora* (Rose) G. D. Rowley 1977.

A. duplicata Thiede & Eggli (KuaS 50(5): 111, 1999). **T**: Mexico, Michoacán (*Lexarza* s.n. [not preserved?]). – **Lit**: McVaugh (1989: as *Polianthes geminiflora*). **D**: Mexico.

Incl. *Bravoa geminiflora* Lexarza (1824) $\equiv$ *Coetocapnia geminiflora* (Lexarza) Link & Otto (1828) $\equiv$ *Polianthes geminiflora* (Lexarza) Rose (1903); **incl.** *Bravoa coetocapnia* Roemer (1847); **incl.** *Bravoa graminiflora* Hemsley (1884) (*nom. inval.*, Art. 61.1).

When transferring *Polianthes geminiflora* to *Agave*, a new name was necessary to avoid homonymy with *A. geminiflora* (Tagliabue) Ker Gawler 1817.

The hybrid of this species with *A. bulliana* (as *Prochnyanthes bulliana*) is known as *Bravoa $\times$ kewensis* hort. and was first recorded 1889.

A. duplicata ssp. *clivicola* (McVaugh) Thiede & Eggli (KuaS 50(5): 111, 1999). **T**: Mexico, Jalisco (*Wilbur* 2133 [MICH]). – **D**: Mexico (Jalisco, Michoacán); mostly on steep shaded slopes, barrancas, gullies, in oak-pine forests, (900-) 1200 - 2150 m, flowers July to September (to October).

$\equiv$ *Polianthes geminiflora* var. *clivicola* McVaugh (1989).

[3b2] Differs from ssp. *duplicata*: **L** somewhat lustrous, flaccid, basal **L** mostly (15-) 25 - 30 (-48) $\times$ (0.8-) 1.5 - 2.5 (-3.7) cm, margins usually very narrowly revolute, with very thin pale scarious or hyaline edges, smooth and entire, rarely obscurely roughened; **Inf** 0.7 - 1.25 m, flowering part 20 - 40 (-60) cm, with 6 - 16 widely spaced flowering nodes.

A. duplicata ssp. *duplicata* – **D**: Mexico (Nayarit,

Guanajuato, Jalisco, Michoacán, Guerrero, México, Distrito Federal, Oaxaca, Hidalgo); mainly on rocky slopes in oak or pine forests, chiefly in the Trans-Mexican Volcanic Belt, (1000-) 2200 - 2800 m, flowers June to August (to November). **I:** Ic. Pl. Rar. Hort. Reg. Bot. Berol., 35, 1828.

[3b2] **R** fleshy, fascicled; **L** emerging from narrowly ovoid bulbs, 1 - 5 in basal **Ros** (or 1 - 3 additional a few cm above the base of the scape), ascending to prostrate, linear or broadly linear, widest in the middle, acute to long-attenuate at the tip, soft, mostly 15 - 30 (-50) × (0.15-) 0.5 - 1.5 cm, sometimes red-spotted near the base, margins thin, pale and scarious, sometimes revolute, usually somewhat erose, sometimes evenly papillose; **Inf** 0.5 - 0.9 (-1.4) m, 'spicate', flowering part 10 - 20 (-40) cm, with 4 - 12 (-16) widely spaced flowering nodes with paired **Fl** (often only 1 developing); **Ped** 4 - 6 (-8) mm (in **Fr** (5-) 8 - 13 mm), strongly ascending; **Ov** erect, ellipsoid; **Tep** pale red, coral-pink, red, orange-red or scarlet, sometimes green distally, tube at anthesis curving strongly outwards from near the base and **Fl** becoming almost horizontal or decurved, slender-terete basally, widened from near or below the middle, mostly 14 - 20 (-23) mm, lobes short, spreading, 1.5 - 3 × 1.5 - 3 mm (outer larger than inner); **Sty** with 3 flat flaring lobes < 1 mm; **Fr** shortly oblong or almost globose, ± 7 - 10 × 7 - 8 mm; **Se** wedge-shaped, sharply angled, 2.5 - 3 mm.

Rather widespread and variable (McVaugh 1989: 249).

A. duplicata ssp. **graminifolia** (Rose) Thiede & Eggli (KuaS 50(5): 112, 1999). **T:** Mexico, Jalisco (Rose 2571 [US]). - **D:** Mexico (S Zacatecas, Aguascalientes, Jalisco, Guanajuato?); grasslands, rocky slopes and grassy openings in oak forests, (1400?) 2000 - 2250 m, flowers July to September.

≡ *Polianthes graminifolia* Rose (1903) ≡ *Polianthes geminiflora* var. *graminifolia* (Rose) McVaugh (1989).

[3b2] Differs from ssp. *duplicata*: Lower **L** face pectinately hispidulous on the veins and margins with thick erect blunt **Gl**-tipped **Ha** 0.1 - 0.2 mm long; exposed portion of **L** sheaths and to a lesser extent lower stem parts similarly pubescent.

Hardly different from ssp. *duplicata* except by the distinctive indumentum (McVaugh 1989).

A. durangensis Gentry (Agaves Cont. North Amer., 433-436, ill., 1982). **T:** Mexico, Durango (Gentry & Gilly 10576 [US]). - **D:** Mexico (S Durango, Zacatecas); rocky slopes and gravelly bajadas in grassland, 1700 - 2600 m.

[2g] Stem short; **Ros** 0.8 - 1.2 × 1.2 - 1.8 m, solitary or caespitose; **L** broadly lanceolate, narrowed above the broad base, widest in the middle, straight to outcurving, asperous, 40 - 90 × 14 - 22 cm, glaucous-grey, pruinose, margins heavily armed, deeply

crenate-mamillate; marginal teeth variously curved, prominent, broadly flattened, 1 - 2 cm, generally 1 - 2 cm apart; terminal **Sp** strong, broadly channelled above, 4 - 6 cm, pruinose-grey over brown; **Inf** 7 - 8 m, 'paniculate', open, scape short, axis zigzag, part-**Inf** sinuously spreading, trifurcate, small, in the upper ¾ of the **Inf**; **Fl** persistently erect, 60 - 80 mm; **Ov** 30 - 45 mm incl. the unconstricted neck; **Tep** yellow, tube cylindrical, 15 - 22 mm; lobes unequal, outer 10 - 12 mm.

Without close relationship to other species of Group *Ditepalae*. Vegetatively, it may be confused with the sympatric *A. scabra* of Group *Agave* (as *Americanae*) (Gentry 1982: 436).

A. dussiana Trelease (Mem. Nation. Acad. Sci. 11: 26-27, t. 28-29, 1913). **T:** Guadeloupe (*Duss* 3961 [NY]). - **D:** Windward Islands (St. Barts, Antigua, Montserrat, Guadeloupe, Martinique, Dominica). **I:** Succulenta 66: 188-189, 1987.

Incl. *Agave montserratensis* Trelease (1913).

[2o] **Ros** acaulescent, solitary; **L** oblong-lanceolate, erect, arching, slightly concave, abruptly or gradually acute, 100 - 175 × 15 cm, slightly greyish deep green, becoming blue-glaucous, then rather glossy, margins straight; marginal teeth curved, slender, or recurved-appressed in the middle of the lamina, somewhat lenticular at their bases, 2 - 3 (-5) mm; terminal **Sp** conically subulate, strongly recurved, base strongly involutely thickened, gradually pointed, 5 - 7 mm, black; **Inf** 5 - 9 m, 'paniculate', part-**Inf** without bulbils, but bulbils occasionally produced in the **Ax** of the lower **Bra** of the scape; **Fl** 60 - 65 mm; **Ov** oblong-fusiform, 30 - 35 mm; **Tep** yellow, tube open, ± 8 mm, lobes 25 mm; **Fr** narrowly to broadly oblong, stipitate at the base, slightly beaked at the tip, (2-) 3 - 4.5 × ± 2 cm.

The occurrence on Dominica was recently reported by Hill & James (1998).

A. ellemeetiana Jacobi (Hamburg. Gart.- & Blumenzeit. 21: 457, 1865). **T** [neo]: Ex cult. (*Anonymus* s.n. [K]). - **D:** Known from cultivation only. **I:** Gentry (1982: 95-96).

[1c] Stem nearly none; **Ros** open, 0.35 - 0.5 × 0.7 - 1 m, surculose; **L** rather few, ovate to oblong, somewhat recurved, reclining at maturity, thickly soft-succulent, widest in the middle, acuminate, plane below beyond the thick base, concave to plane above, smooth, 50 - 70 × 12 - 20 cm, light bright green, margins friable, smooth, sometimes reddish and finely serrulate towards the **L** tip; terminal **Sp** none, but **L** tip shortly acuminate and slightly calloused; **Inf** erect, 3 - 4.5 m, 'spicate', densely flowered from near the base, part-**Inf** usually with 4 **Fl**; **Ped** united in pairs, 15 - 20 mm; **Fl** campanulate, 28 - 40 mm; **Ov** 13 - 20 mm, neck conspicuously elongate; **Tep** pale greenish-yellow, tube very short, 1 - 2 mm, lobes 13 - 15 mm; **Fil** long exserted, 50 - 60 mm.

Introduced into cultivation from Mexico $\pm$ 1864 and apparently persisting in cultivation in Europe up to the present (Gentry 1982: 97). Very similar to some forms of *A. pedunculifera* of Group *Serrulatae* (as *Amolae*) (Ullrich 1990b).

A. ensifera Jacobi (Nachtr. Versuch syst. Glied. Agaveen 1: 138, 1868). **T** [neo]: Ex cult. La Mortola (Berger s.n. [US 1023791+1023763]). – **D**: Known from cultivation only.

Incl. *Agave heteracantha* Baker (1877) (*nom. illeg.*, Art. 53.1); **incl.** *Agave lophantha* var. *latifolia* A. Berger (1915) $\equiv$ *Agave univittata* var. *latifolia* (A. Berger) Breitung (1959).

[1g] **Ros** dense, caespitose; **L** linear-lanceolate, ensiform, leathery-fleshy, strongly convex below and above, 50 - 60 $\times$ 4 - 5 (3.8 - 4 near the base) cm, smooth and dark green with a clear light stripe 5 - 7 mm wide, margins with a narrow grey border 0.5 - 1 mm wide; marginal teeth mostly antrorsely curved, 4 - 6 mm, light grey, closely set, 1 - 2 cm apart, interspersed with smaller teeth, altogether 30 - 40 teeth per side; terminal **Sp** short, basal groove above short and opening broadly with decurrent border, 1 - 1.5 cm, brown to grey; **Inf** 2 - 2.5 m, 'spicate', part-**Inf** mostly with **Fl** in pairs; **Ped** 2 - 3 mm; **Fl** 35 - 42 mm; **Ov** 20 - 24 mm, neck constricted, $\pm$ 3 mm; **Tep** light yellowish, tube open, short, 2 - 3 mm, lobes subequal, 14 - 17 mm.

Of unknown origin and commonly cultivated along the Mediterranean Riviera at Berger's time; apparently related to the *A. lechuguilla* - *A. difformis* group (Gentry 1982: 139).

A. evadens Trelease (Mem. Nation. Acad. Sci. 11: 20-21, t. 9-10, 116, 1913). **T**: Trinidad (*Crueger* 1333 [Herb. Urban]). – **Lit**: Hummelinck (1938). **D**: Trinidad.

Incl. *Agave polyacantha* Baker (1888) (*nom. illeg.*, Art. 53.1); **incl.** *Agave vivipara* Hart (1890) (*nom. illeg.*, Art. 53.1); **incl.** *Agave polyantha* Dodge (1897).

[2q] **Ros** shortly caulescent, somewhat suckering (?); **L** narrowly oblanceolate, gradually acute, openly concave or somewhat conduplicate, or with inrolled margins above, 70 - 100 cm, margins almost straight; marginal teeth small, 0.5 - 1.5 mm, rather close together; terminal **Sp** conical, straight or somewhat recurved, slightly involute at the base, 1 - 1.4 cm, slightly or not decurrent; **Inf** slender, 'paniculate', part-**Inf** few and lax, on ascending **Br**; **Fl** 47 - 55 mm; **Ov** oblong-fusiform, 25 mm; **Tep** colour not described, tube open, 2 - 3.5 mm, lobes 19 - 25 mm; **Fr** distinctly stipitate, $\pm$ 4 cm.

According to the protologue intermediate in foliage between *A. cocui* and *A. boldinghiana* and known to Trelease from photographs and dissociated flowers only. If the name *A. polyantha* Dodge really proves to be conspecific, it would have priority.

A. felgeri Gentry (US Dept. Agric. Handb. 399: 60-62, ill., 1972). **T**: Mexico, Sonora (Gentry 11343 [US, DES, MEXU, MICH]). – **Lit**: Ullrich (1991f: with ill.); Turner & al. (1995). **D**: Mexico (Sonora); arid desert lowlands near coasts. **I**: Gentry (1982: 108).

[1d] **Ros** small, surculose, forming rather closely caespitose groups; **L** rather few, linear to narrowly lanceolate, straight or falcate, widest at the base, convex below, plane above, epidermis rugose or scabrous above, 25 - 35 $\times$ 0.7 - 1.5 cm, green to yellow-green, with faint imprints from the central bud, frequently with pale median stripe, margins with weakly filiferous narrow brown border, smooth; terminal **Sp** weak, small, 0.8 - 1.5 cm, grey; **Inf** 1.5 - 2.5 m, 'spicate', flowering in the upper $\frac{1}{4}$, part-**Inf** with 1 - 2 **Fl**; **Ped** strong, single or geminate, 2 - 5 mm; **Fl** 25 - 30 mm (dry, relaxed); **Ov** 12 - 14 mm; **Tep** yellow (?), tube 2 - 4 mm, lobes about equal, 10 - 12 mm.

Very similar to *A. schottii* from Group *Parviflorae* in vegetative features, but aligned with Group *Filiferae* due to its open shallow flower tube and long lobes (Gentry 1982: 109). Ullrich (l.c.) emphasizes vegetative and geographical criteria and suggests a placement in Group *Parviflorae*.

A. filifera Salm-Dyck (Hort. Dyck., 309, 1834). **T**: [neo - icono]: Ill. Hort. 7(4): t. 243, 1860. – **D**: Mexico.

A. filifera ssp. **filifera** – **D**: Mexico (San Luis Potosí, Aguascalientes, Guanajuato, Hidalgo, Querétaro, Michoacán, México, Veracruz). **I**: Gentry (1982: 104, 111).

Incl. *Agave filifera* var. *elatior* hort. ex Besaucèle (s.a.); **incl.** *Agave filifera* var. *immaculata* hort. ex Besaucèle (s.a.); **incl.** *Agave filifera* var. *longifolia* hort. ex Besaucèle (s.a.); **incl.** *Agave filifera* var. *mediopicta* hort. ex Besaucèle (s.a.); **incl.** *Agave filifera* var. *splendens* hort. ex Besaucèle (s.a.); **incl.** *Agave filifera* var. *viridis* hort. ex Besaucèle (s.a.); **incl.** *Agave filifera* var. *candida superba* hort. ex Besaucèle (s.a.) (*nom. inval.*, Art. 24.2); **incl.** *Agave filamentosa* Salm-Dyck (1859) $\equiv$ *Agave filifera* var. *filamentosa* (Salm-Dyck) Baker (1877); **incl.** *Agave pseudofilifera* Ross & Lanza (1892).

[1d] **Ros** dense, small, forming large clumps with age; **L** many, lanceolate, straight, broadest in the middle, acuminate, thickened and convex above and below from the base to the middle of the lamina, 15 - 30 $\times$ 2 - 4 cm, green, with white impressions from the central bud, smooth, margins finely filiferous; terminal **Sp** flat above, rounded below, 1 - 2 cm, greyish; **Inf** 2 - 2.5 m, 'spicate', tapering, densely flowered in the upper $\frac{1}{2}$, part-**Inf** mostly with **Fl** in pairs; **Ped** thick, short; **Fl** ascending-outcurving, 30 - 35 mm; **Ov** fusiform, 13 - 15 mm, neck furrowed; **Tep** reddish, tube funnel-shaped, furrowed, 5 - 6 mm, lobes equal, 14 mm. – *Cytology*: 2n = 60.

Separable from the closely related ssp. *schidigera* by its caespitose habit, shorter and thicker leaves, and smaller flowers with a shorter tube (Gentry 1982: 110). Ullrich (1992d) reduced *A. schidigera* and *A. multifilifera* to subspecies of *A. filifera*. This reclassification needs further field study.

A. filifera ssp. **microceps** Kimmach (CSJA 67(5): 306-310, ill., 1995). **T:** Mexico, Sinaloa (Kimmach 1923 [HNT, MEXU, US]). – **D:** Mexico (Sinaloa).

Incl. *Agave filifera* var. *compacta* Trelease (1914).

[1d] Differs from ssp. *filifera*: **Ros** 20 - 30 × 20 - 35 cm, densely caespitose, forming clusters ≥ 1 m Ø; **L** linear to linear-oblongate, abruptly widened to 2.5 - 3.5 cm within 2 cm from the base, acuminate, acute, 12 - 20 × 1 - 2 cm, margins with a brownish or purplish-grey band ± 2 mm wide, white-filiferous, youngest **L** sometimes with 1 - 3 white streaks on the upper face; **Inf** 1 - 1.35 m, part-**Inf** in the upper 80 cm, with paired **Fl**; **Fl** at right angles to the axis, 50 - 55 mm; **Ov** 7 - 8 mm; **Tep** greenish-yellow.

According to the protologue similar in its rosettes to ssp. *schidigera* but much smaller and proliferous. It is possibly a redescription of *A. filifera* var. *compacta*, but nevertheless with priority on subspecies level.

A. filifera ssp. **multifilifera** (Gentry) B. Ullrich (Brit. Cact. Succ. J. 10(3): 66, 1992). **T:** Mexico, Chihuahua (Gentry 8167 [US 2558493 + 2558494, DES, MEXU]). – **D:** Mexico (Sonora, Chihuahua, Sinaloa, Durango); cliffs and rocky sites in pine-oak forests, 1400 - 2200 m. **I:** Gentry (1982: 104).

Fig. III.b

≡ *Agave multifilifera* Gentry (1972).

[1d] Differs from ssp. *filifera*: Stems short but clearly developed; **Ros** ± 1 × 1.5 m, solitary; mature **L** 200 in number, linear-lanceolate, erectly spreading to declining, firm but pliable, broadest at the base, 50 - 80 × 1.2 - 3.5 cm, light green, margins long and copiously filiferous; terminal **Sp** chestnut-brown to grey with age; **Inf** to 5 m, densely flowered from above the **L**, part-**Inf** with 2 - 3 **Fl**; **Fl** 40 - 43 mm; **Ov** 20 - 21 mm, neck constricted, faintly grooved, 5 mm; **Tep** green with lavender hue in bud, at anthesis pale green with pink tinge on the lobes, lobes subequal, 16 - 17 mm.

One of the most robust taxa in Group *Filiferae*, differing from the other ssp. of *A. filifera* mainly by its larger dimensions. See also the note for ssp. *schidigera*.

A. filifera ssp. **schidigera** (Lemaire) B. Ullrich (Brit. Cact. Succ. J. 10(3): 65, 1992). **T:** [neo - icono]: Ill. Hort. 9(7): t. 330, 1862. – **Lit:** McVaugh (1989); Ullrich (1992d). **D:** Mexico (Chihuahua, Sinaloa, Durango, Zacatecas, San Luis Potosí, Nayarit, Jalisco, Guanajuato, Aguascalientes, Michoacán, Guerrero). **I:** Gentry (1982: 104, 120-121).

≡ *Agave schidigera* Lemaire (1861) ≡ *Agave filifera* var. *schidigera* (Lemaire) A. Terracciano (1885); **incl.** *Agave taylorii* hort. ex Besaucèle (s.a.) ≡ *Agave schidigera* var. *taylorii* (Besaucèle) H. Jacobsen (1955); **incl.** *Agave filifera* var. *adornata* Scheidweiler (1861); **incl.** *Agave filifera* var. *pannosa* Scheidweiler (1861); **incl.** *Littaea roezlii* Roezl (1861) (*nom. inval.*, Art. 34.1b); **incl.** *Agave filifera* var. *angustifolia* Lemaire (1865); **incl.** *Agave filifera* var. *ignescens* Lemaire (1865); **incl.** *Agave schidigera* var. *angustifolia* Lemaire (1865); **incl.** *Agave schidigera* var. *ignescens* Lemaire (1865); **incl.** *Agave schidigera* var. *plumosa* Lemaire (1865); **incl.** *Agave vestita* S. Watson (1890); **incl.** *Agave wrightii* J. R. Drummond (1909) (*nom. illeg.*, Art. 53.1); **incl.** *Agave discreptata* J. R. Drummond (1912); **incl.** *Agave perplexans* Trelease (1914).

[1d] Differs from ssp. *filifera*: Stems short; **Ros** symmetrical, solitary, 0.7 - 1 m Ø; **L** sometimes falcate, relatively thin, pliable, widest at or below the middle, 30 - 40 (-50) × 1.5 - 3 (-4) cm, green to greyish-green or yellowish-green, rarely reddish, with imprints from the next younger **L**, margins brown to white, coarsely white-filiferous; terminal **Sp** 0.5 - 1.6 (-2) cm, brown to grey with age, shortly decurrent; **Inf** 2 - 3.5 m, slender, laxly flowered in the upper ½; **Fl** 30 - 45 mm; **Ov** fusiform, 12 - 20 mm; **Tep** green to yellow or flushed with purple, tube narrowly funnel-shaped, 7 - 10 mm, lobes equal, 13 - 20 mm.

Closely related to ssp. *filifera*, but separable by its non-succulose habit, longer, thinner, more pliable leaves and coarse rather than finely filiferous margins (Gentry 1982: 120). Ullrich (1992d) reduced this taxon as well as *A. multifilifera* to subspecific rank under *A. filifera* based on mere literature interpretations, which for corroboration would require a critical field study. Since *A. filifera* ssp. *microceps* is closest to *A. [filifera ssp.] schidigera*, the concept of Ullrich is nevertheless followed here in order to avoid a new combination for ssp. *microceps* under *A. schidigera*.

A. flexispina Trelease (CUSNH 23: 133, 1920). **T:** Mexico, Durango (Palmer 330 [US, NY]). – **D:** Mexico (S Chihuahua, Durango, Zacatecas); grassland and oak woodland, 1300 - 2300 m. **I:** Gentry (1982: 437).

[2g] **Ros** open, small, 25 - 35 × 50 - 70 cm, solitary or caespitose; **L** few (± 40 in mature **Ros**), ovate, acuminate, 16 - 30 × 6 - 8 cm, glaucous- to yellowish-green, margins undulate to crenate; marginal teeth mostly retrorse, larger teeth mostly 5 - 8 mm, brown to pruinose, 1 - 1.5 cm apart, on small tubercles, sometimes with small intermittent teeth; terminal **Sp** acicular, usually flexuous, flat to openly grooved near the base, 2.5 - 3.5 cm, brown to pruinose-grey, decurrent to the upper teeth; **Inf** 2.5 - 3.5 m, 'paniculate', slender, rather open, frequently

narrow, part-**Inf** small, 6 - 12, few-flowered; **Fl** 50 - 70 mm; **Ov** cylindrical, slightly angular, 22 - 35 mm, neck obscure; **Tep** greenish-yellow with red tinge, tube cylindrical to urceolate, 13 - 18 mm, lobes unequal, outer 10 - 18 mm.

In appearance like a small *A. shrevei* or *A. palmeri*, but different in its flowers (Gentry 1982: 438).

A. fortiflora Gentry (US Dept. Agric. Handb. 399: 122-126, ill., 1972). **T**: Mexico, Sonora (Gentry 19808 [US]). – **D**: Mexico (Sonora). **I**: Gentry (1982: 421, 439-440).

[2g] **Ros** open, up to 1 × 1.8 m, mostly solitary; **L** straightly ascending or outcurving and conduplicate, long-acuminate, gradually narrowed above the dilated base, widest in the middle, finely tuberculate-rugose (incl. teeth and **Sp**), to 50 - 100 × 8 - 12 cm, light grey-glaucous, usually cross-zoned, margins straight or teeth in the middle of the lamina on small tubercles; marginal teeth curved downwards or erect, 5 - 10 mm (middle of the lamina), 1 - 3 cm apart, with irregularly arranged smaller intermittent teeth; terminal **Sp** subulate, rounded below, narrowly grooved above, chestnut-brown to light grey, decurrent along the margin to the uppermost teeth; **Inf** 4 - 6 m, 'paniculate', open and ovoid, scape short, part-**Inf** dense, 12 - 18; **Fl** long-lived, erect, 72 - 82 mm; **Ov** 45 - 50 mm, pale green; **Tep** yellow, tube broadly bulging, 11- 13 mm, elliptic in cross-section, lobes 20 - 23 mm.

Distinct by its large, strong and long-lasting flowers and without close relatives in Group *Ditepalae* (Gentry 1982: 439).

A. fourcroydes Lemaire (Ill. Hort. 11(Misc.): 65, 1864). – **D**: Cultivated only; mainly E Mexico. **I**: Gentry (1982: 576).

Incl. *Agave ixtlioides* Lemaire ex Jacobi (1866); **incl.** *Agave rigida* var. *longifolia* Engelm (1875); **incl.** *Agave ixtli* var. *elongata* Baker (1877) ≡ *Agave rigida* var. *elongata* (Baker) Baker (1881) ≡ *Agave elongata* (Baker) A. Berger (1912) (*nom. illeg.*, Art. 53.1); **incl.** *Agave longifolia* hort. ex A. Berger (1915); **incl.** *Agave ixtli* hort. ex A. Berger (1915) (*nom. illeg.*, Art. 53.1); **incl.** *Agave sullivanii* Trelease (1920).

[2f] Stem thick, 1 - 1.7 m; **Ros** large, suckering; **L** straight, linear, rigid, thickly rounded at the base, acuminate, guttered, 120 - 180 × 8 - 12 cm, margins straight; marginal teeth slender, 3 - 6 mm, dark brown, regularly spaced; terminal **Sp** conical, stout, openly short-grooved above, mostly 2 - 3 cm, dark brown; **Inf** 5 - 6 m, 'paniculate', part-**Inf** 10 - 18 in the upper ½ of the **Inf**, bulbiferous, never producing **Se**; **Fl** 60 - 70 mm; **Ov** fusiform, roundly-trigonal, 35 - 40 mm, neck briefly constricted; **Tep** greenish-yellow, tube urceolate, 12 - 16 mm, lobes subequal, 16 - 18 mm. – *Cytology*: 2n = 60, ± 140, 150.

Widely cultivated for fibre ("Henequen") esp. in E Mexico (Gentry 1982). The different cultivars subsumed under *A. fourcroydes* show different degrees of similarity with its wild progenitor *A. vivipara* (Colunga-García Marín & al. 1996: as *A. angustifolia*). The isozyme studies of Colunga-García Marín & al. (1999) indicated *A. fourcroydes* to represent a polyphyletic assemblage of different cultivars independently derived from within the variable *A. vivipara*. Consequently, the species name *A. fourcroydes* should be abandoned and the different cultivars be named under its progenitor species (e.g. *A. vivipara* 'Sac Ki').

A. franzosinii Baker (BMI 1892: 3, 1892). **T** [neo]: Ex cult. Huntington (Gentry 10163+19866 [US, DES]). – **D**: Known from cultivation only. **I**: Gentry (1982: 276, 291).

[2a] **Ros** widely spreading, very large, 2 - 2.7 (-3) × to 4.5 m, freely suckering; **L** lanceolate, spreading, recurved, or sharply reflexed, narrowed at the base, thickened and convex below towards the base, hollowed above, somewhat asperous, 180 - 220 × 22 - 35 cm, light glaucous-grey or bluish-glaucous variously marked with green below the middle of the lamina, margins straight to repand; larger marginal teeth (middle of the lamina) 8 - 10 mm, dark brown, remote, on fleshy prominences; terminal **Sp** 3 - 6 cm, dark brown, decurrent along the inrolled **L** tip; **Inf** 8 - 11.4 m, 'paniculate', broadly cylindrical, to 2.9 m broad, scape short, axis strong, part-**Inf** broadly spreading, several times compound; **Fl** large, 83 - 100 mm; **Ov** 35 - 45 mm, light bright green; **Tep** yellow, soon withering, tube 18 - 22 mm, lobes 30 - 32 mm.

A distinctive species not easily confused with, and obviously related to *A. americana* (Gentry 1982: 291). Howard & al. (1979) use *A. beaulueriana* Jacobi 1869 (here treated amongst the unresolved names) as older valid name for this taxon and consequently list *A. franzosinii* as synonym. Berger (1915: 157) ascribes *A. franzosinii* to Nissen ex Ricasoli (Della utilità dei giardini d'acclimazione, 7, 1888) as name only. Sewell (Gard. Chron. ser. 3, 1889: 639) and W. Watson (Bull. Misc. Inf. [Kew] 1889: 301) also used the name before Baker. The correct name and author for this plant therefore needs further study.

A. funkiana K. Koch & C. D. Bouché (Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 3: 47, 1860). **T**: Mexico, Hidalgo (Gentry 12273 [US, DES]). – **D**: Mexico (Nuevo León, San Luis Potosí, Hidalgo); 250 - 1800 m. **I**: Gentry (1982: 126, 140).

[1g] **Ros** open, 0.6 - 0.9 × 1.2 - 1.8 m, freely suckering; **L** linear, radiating, firm, straight or somewhat falcate, patulous, base broadly clasping, convexly thickened below, concave above, mostly 60 - 80 × 3.5 - 5.5 cm, yellowish-green to dark

green, frequently with pale median stripe, margins horny, nearly straight, firm, thin, brown to grey; marginal teeth mostly directed downwards, regular, slender, 3 - 5 mm, 1 - 2.5 cm apart, with a few small irregularly arranged intermittent teeth; terminal **Sp** conical-subulate, with a narrow to open groove above, 1 - 3 cm, brown to white; **Inf** slender, 3.5 - 4.5 m, 'spicate', laxly flowered in the upper ½, part-**Inf** with paired **Fl**; **Ped** geminate, ± 1 cm; **Fl** 40 - 45 mm; **Ov** oblong-fusiform, 20 - 24 mm, neck constricted; **Tep** pale glaucous-green, tube 3.5 - 4 mm, lobes 18 - 19 mm.

Obviously related to *A. lophantha*, but differing in its larger size, regular and linear slightly concave leaves with nearly straight fine margins, and numerous regular fine teeth (Gentry 1982: 140). The specimen cited by Gentry (l.c., 189) from Chiapas (Gentry 12195) belongs to *A. ghiesbreghtii* (Lott & García-Mendoza 1994).

A. fusca (Ravenna) Thiede & Eggli (KuaS 52: [in press], 2001). **T:** Guatemala (*Ravenna* 325 [Herb. Ravenna]). – **D:** Guatemala (Chimaltenango - Comalapa); sandy plains.

≡ *Manfreda fusca* Ravenna (1987).

[3a3] Rhizome 2 - 2.3 cm Ø; **L** several, sprawling, narrowly lanceolate, canaliculate, lower face carinate, slightly scabrous, 30 - 50 × 2.2 - 3 cm, ash-green; **Inf** scape stiff, **Bra** rather distant; **Fl** ± 20, crowded, single, apparently sessile, with foetid odour; **Ov** oblong, 12 - 17.8 × 6.6 mm, greenish; **Tep** 37 mm, outer face glaucous-green, lobes spreading to reflexed, linear-lanceolate, 14.8 - 16 × 4 - 5.8 mm, tip apiculate-tuberculate, outer face dark brown; **Fil** sparsely glandular-pilose, 39 - 42 mm, dirty greenish-white with diminutive dark streaks; **Sty** reflexed and twisted before the Anth dehisce, almost straight or slightly curved afterwards, to 57 mm; **Sti** capitate 3-lobed; **Fr** unknown.

In the protologue, no differential diagnosis is given nor is the relationship indicated. García-Mendoza & Castañeda Rojas (2000) clearly place the species in the *A. guttata* subgroup of Subgen. *Manfreda*, based on a study of additional specimens at MEXU. It is distinct in its flower colour and foetid odour. The species was erroneously omitted from the treatment of the family for the 'Flora Mesoamericana' (Lott & García-Mendoza 1994).

A. geminiflora (Tagliabue) Ker Gawler (J. Sci. Arts (London) 2: 86-90, 1817). **T:** [lecto - icono]: Bibliot. Ital. Giorn. Lett. 1: 100, fig. – **Lit:** Mc-Vaugh (1989). **D:** Mexico (Nayarit); on rocks in oak woodland, 1000 - 1400 m, only known from one small area. **I:** Gentry (1982: 104, 113-114); Kaktusblüte 1995: 41-44.

≡ *Littaea geminiflora* Tagliabue (1816); **incl.** *Agave geminiflora* var. *stricta-viridis* hort. ex Besau-cèle (s.a.); **incl.** *Yucca bosicii* Hort. Panorm. ex Hor-

nemann (1813); **incl.** *Bonaparteia juncea* Willdenow (1814); **incl.** *Yucca bosicii* Desfontaines (1815) (*nom. illeg.*, Art. 53.1); **incl.** *Bonaparteia flagelliformis* Donnersmark (1820); **incl.** *Agave angustissima* Engelman (1875); **incl.** *Agave geminiflora* var. *knightiana* J. R. Drummond (1909); **incl.** *Dracaena bosicii* Hort. Cels ex A. Berger (1915).

[1d] Stem short; **Ros** dense, 0.7 - 1 m, somewhat broader, solitary; **L** many, linear, eventually arching, flexible, narrow, pliable, abruptly acute, roundly convex below and above, 45 - 60 × 0.6 - 0.8 cm, green, smooth, margins finely filiferous or rarely naked; terminal **Sp** shortly subulate, 5 - 7 mm, greyish; **Inf** long tapering, stout at the base, 4 - 6 m, 'spicate', flowering in the upper ⅔ - ¾, part-**Inf** with mostly geminate **Fl**; **Ped** slender, 5 - 8 mm; **Fl** 40 - 52 mm; **Ov** slender, 16 - 20 mm, neck grooved; **Tep** greenish below, flushed above with red or purple, tube narrowly funnel-shaped, 6 - 11 mm, lobes slightly unequal, 18 - 21 mm.

Distinct within Group *Littaea* by its relatively large simple stem with innumerable, very narrow, pliable, smooth leaves and large 'spikes' with relatively remote long flowers. It is most closely related to *A. ornithobroma* (Gentry 1982: 112). The report of a specimen of this taxon from Sinaloa by Mc-Vaugh (1989: 135) is erroneous, since the collection cited (Gentry 18358) is the type collection of *A. ornithobroma*.

A. gentryi B. Ullrich (Succulenta 69(10): 210-214, ill., 1990). **T:** Mexico, Nuevo León (Gentry 20159 [DES]). – **D:** Mexico (Coahuila, Nuevo León, Tamaulipas, Durango, Zacatecas, San Luis Potosí, Hidalgo, México, Puebla); on limestone in pine-oak forests or chaparral, 1850 - 2800 m. **I:** Gentry (1982: 597, 599, as *A. macroculmis*).

[2b] Stem thick, short; **Ros** rigid, medium to large, 0.6 - 1 m Ø, solitary, with rhizomatous offsets; **L** 30 - 45, triangularly long-acuminate, base very broad and thick, concave, 60 - 100 × 17 - 26 cm, dark to light green, sometimes faintly glaucous, margins partly or entirely horny; marginal teeth nearly straight, commonly 8 - 12 mm (middle of the lamina), chestnut-brown to greyish-brown, 2 - 4 cm apart, cusps from well-rounded bases; terminal **Sp** subulate, broadly channelled above for ⅔ of its length, very strong, 4.5 - 6.5 cm, dark brown to greyish, long decurrent; **Inf** 3 - 5 m, 'paniculate', ellipsoid, scape stout, scape **Bra** large and fleshy, with entire margins, closely imbricate at the base of the part-**Inf**, part-**Inf** dense, 10 - 28; **Fl** 70 - 90 mm; **Ov** 35 - 55 mm, green, neck grooved; **Tep** reddish in bud, opening yellow, tube funnel-shaped, 11 - 16 mm, lobes unequal, 20 - 28 mm.

Easily recognizable by the large fleshy scape bracts congested below the inflorescences, and its extremely broad-based rigid long-pointed green leaves (Gentry 1982: 598, as *A. macroculmis*). Gentry's use of the name *A. macroculmis* for this

plant must be rejected, since this name is a synonym of *A. atrovirens*. Since the plant was without name, Ullrich (l.c.) described it as new. See also under *A. montana*.

A. ghiesbreghtii Lemaire ex Jacobi (Hamburg. Gart.- & Blumenzeit. 20: 545, 1864). **T:** US. – **D:** Mexico (México, Guerrero, Puebla, Oaxaca, Chiapas), Guatemala. **I:** Gentry (1982: 141). **Fig. III.c**

Incl. *Agave inghamii* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave leguayana* Verschaffelt (1868); **incl.** *Agave roezliana* Baker (1877); **incl.** *Agave roezliana* var. *inghamii* hort. ex Baker (1877); **incl.** *Agave purpusorum* A. Berger (1915); **incl.** *Agave roezlii* hort. ex A. Berger (1915) (*nom. inval.*, Art. 61.1); **incl.** *Agave huehueteca* Standley & Steyermark (1943).

[1g] **Ros** open, short, copiously suckering; **L** few, broadly lanceolate, ovate or deltoid, straight or up-curving, thick, rigid, narrowed above the base and widest in the middle, apex acuminate, convex below, plane to slightly hollowed or guttered above, 30 - 40 × 7 - 10 cm, or more rarely broadly linear and 35 - 38 × 5.5 - 6 cm, dark to light green, margins horny, relatively narrow, brown; marginal teeth frequently straight, sometimes curved upwards or downwards, larger teeth 5 - 8 (-10) mm, brown to greyish, 1 - 3 cm apart, reduced at the **L** tip; terminal **Sp** subulate, 2 - 4 cm, brown to grey; **Inf** 3 - 4 m, 'spicate', densely flowered; **Fl** 40 - 50 mm; **Ov** cylindrical, 16 - 20 mm, neck constricted; **Tep** greenish-brown to purplish, paler within, tube broadly funnel-shaped, 3 - 5 (-10?) mm, lobes subequal, 15 - 21 mm.

Closely related to *A. kerchovei*, but different by its shorter and broader leaves with more and smaller teeth on narrower and darker horny margins (Gentry 1982: 142).

A. gigantensis Gentry (Occas. Pap. Calif. Acad. Sci. 130: 63-67, ill. (pp. 65-66, 68), 1978). **T:** Mexico, Baja California Sur (Gentry & McGill 23320 [US, DES, MEXU, SD]). – **D:** Mexico (Baja California Sur); 600 - 1520 m. **I:** Gentry (1982: 387-388).

[2h] **Ros** rather open, 0.5 - 1 × 0.8 - 1.2 m, solitary; **L** few, broadly lanceolate, plane, rigid, thick, fleshy, markedly narrowed at the base, widest in the middle, acuminate, smooth, 40 - 75 × 11 - 16 cm, green to glaucous-green, turning red to purplish when plants are flowering, margins undulate to prominently mamillate; marginal teeth variously curved, basis thick, frequently 2 - 3 teeth cuspidate, confluent along the upper leaf margins, large, 10 - 20 mm and more, brown to light greyish, up to 6 - 8 cm apart; terminal **Sp** strongly subulate, 3 - 6 cm, grey, long decurrent as pronounced horny margin; **Inf** 4 - 5 m, 'paniculate', rather narrow, part-**Inf** rather small, 15 - 25 in the upper ¼ - ½ of the **Inf**; **Fl** slender, 48 - 60 mm; **Ov** slender, fusiform, neck

constricted; **Tep** buds waxy white, open bright pale yellow, tube spreading, 4 - 5 mm, lobes 18 - 25 mm.

A. avellanidens and *A. moranii* appear to be the closest relatives (Gentry 1982: 386).

A. gilbertii A. Berger (Monatsschr. Kakt.-kunde 14: 126, 1904). **T** [lecto]: Ex cult. (*Anonymus* s.n. [K [sub *A. bakeri*]]). – **D:** Known from cultivation only. **I:** Gentry (1982: 72).

Incl. *Agave bakeri* Hooker fil. ex W. Watson (1903) (*nom. illeg.*, Art. 53.1).

[1b] Stem short; **Ros** solitary, not suckering; **L** many, lanceolate, recurving, coriaceous, narrowed and thickened near the base, broadest in the middle, convex beneath, concave to plane above, 90 - 100 × 10 - 12 cm, glaucous-green, margins thin, brown; marginal teeth none; terminal **Sp** slender, 0.5 - 2 cm; **Inf** to 3 m, 'spicate', cylindrical, densely flowered from near the base; **Fl** 50 - 60 mm; **Ov** fusiform, slender, ± 20 mm, neck slender; **Tep** greenish outside, whitish within, tube 6-furrowed, 11 - 12 mm, lobes reflexed or revolute, 20 mm.

The name *A. bakeri* Hooker fil. ex W. Watson (1903) represents an illegitimate later homonym of *A. bakeri* Ross (1894). The valid name for the taxon is the replacement name *A. gilbertii* published by Berger, in contrast to the treatment by Gentry (1982: 71). The species apparently disappeared in cultivation after the original plant died. It has never been recollected (Gentry l.c.).

A. ×glomeruliflora (Engelmann) A. Berger pro sp. (Agaven, 95, 1915). **T:** [lecto - icono]: Gard. Chron. ser. nov., 1883: 19, fig. 6. – **D:** USA (Texas), Mexico (Coahuila); grasslands, 620 - 1520 m. **I:** Gentry (1982: 143).

≡ *Agave heteracantha* var. *glomeruliflora* Engelmann (1883) ≡ *Agave lechuguilla* fa. *glomeruliflora* (Engelmann) Trelease (1920); **incl.** *Agave chisosensis* C. H. Müller (1939).

Obviously of hybrid origin with morphological gradations between *A. lechuguilla* and *A. neomexicana* and/or *A. havardiana* (Gentry 1982: 143) and thus only representing an aggregate of different habitually similar natural hybrids. Gentry's selection of a neotype (l.c.) is superseded by his simultaneous selection of a lectotype (l.c.).

A. ×gracilipes Trelease pro sp. (Annual Rep. Missouri Bot. Gard. 22: 95, 1912). **T:** USA, Texas (Mulford 293+293a [MO, NY]). – **D:** USA (SE New Mexico, W Texas); Mexico (Chihuahua); on limestone among grama grass, 1250 - 1850 m. **I:** Gentry (1982: 522, 527-528, 536).

A very variable complex, identified as the natural hybrid *A. lechuguilla* × *A. neomexicana* by Trelease (l.c.), Gentry (1982: 530), and Pinkava & Baker (1985). Since the latter putative parent is absent from major parts of the area of *A. ×gracilipes*, other parent species must be involved as well (*A. parryi*?).

A. gracillima A. Berger (Agaven, 33, 288 [erratum], 1915). **T:** Mexico, Durango (*Rose* 2341b [US]). – **Lit:** McVaugh (1989). **D:** Mexico (S Durango, Nayarit); valleys, grassy plains and oak forests in the mountain region, 1100 - 1370 m, flowers mid-August to late November.

Incl. *Manfreda elongata* Rose (1903) $\equiv$ *Polianthes elongata* (Rose) Shinnars (1966) (*nom. illeg.*, Art. 53.1); **incl.** *Agave gracilis* A. Berger (1915) (*nom. illeg.*, Art. 53.1); **incl.** *Polianthes rosei* Shinnars (1967) (*nom. illeg.*, Art. 52.1).

[3a2] Plants large (for Subgen. *Manfreda*); **L** 4, arching, linear-lanceolate, strongly recurved, deeply channelled, herbaceous, with many closely-spaced veins, 35 - 49.5 (-76) $\times$ 2.8 - 3.9 (-5 fide Rose (1903)) cm, margins narrow to medium broad, hyaline, entire; **Inf** 90 - 120 cm (fide Rose l.c.), 'spicate', flowering part half-dense, 17.5 - 31.5 cm, with 20 - 27 sessile **Fl**; mature **Fl** (apparently) almost horizontal; **Ov** ellipsoid, 10 - 14 mm, without neck; **Tep** brownish or yellowish-green, tube cylindrical, bluntly 6-angled, straight, not markedly constricted above and at an angle with the **Ov**, (8-) 11 - 15 mm, lobes oblong, reflexed, 12 - 16 mm; **Fil** curved upwards at maturity; **Sty** curved upwards at maturity, exerted for 28 - 36 mm; **Sti** clavate, trigonous, shallowly furrowed; **Fr** and **Se** unknown.

Distinguished by its long recurving deeply channelled leaves, the long-acuminate floral bracts, and the styles, which are usually much longer than the stamens (Verhoek-Williams 1975: 285).

A. grijalvensis B. Ullrich (KuaS 41(6): 102-108, ill., 1990). **T:** Mexico, Chiapas (*Gentry* 12204 [DES, US]). – **D:** Mexico (Chiapas); calcareous soil. **I:** Gentry (1982: 621, 626, as *A. kewensis*).

[2g] **Ros** open, large, solitary; **L** few, narrowly lanceolate, arching or sprawling, pliable, thickly succulent, guttered, 120 - 180 $\times$ 12 - 15 cm, yellowish-green, margins straight or nearly so; marginal teeth straight, small, larger teeth 3 - 4 mm (in the upper $\frac{1}{3}$ of the lamina), 1 - 3 cm apart, much reduced below or lacking on the lower $\frac{1}{3}$ of the lamina; terminal **Sp** acicular, narrowly grooved above, 3 - 4.5 cm, not decurrent; **Inf** 3 - 5 m, 'paniculate', scape usually short, part-**Inf** 3-branched, 12 - 20 in the upper $\frac{1}{2}$ of the **Inf**; **Fl** slender, 60 - 74 mm; **Ov** slender, cylindrical, 30 - 40 mm, neck slightly constricted; **Tep** yellow, tube 12 - 15 mm, lobes unequal, 18 - 20 mm.

Ullrich (l.c.) rejected Gentry's use of the name *A. kewensis* for this plant, and provided the new name. He provisionally placed the species in Group *Marmoratae* based on vegetative features (instead of Gentry's placement of his "*A. kewensis*" in his Group *Sisalanae*).

A. grisea Trelease (Mem. Nation. Acad. Sci. 11: 34-35, t. 54-56, 1913). **T:** Cuba, Santa Clara (*Grey* 1 [MO?]). – **Lit:** León (1946). **D:** S-C Cuba.

Incl. *Agave grisea* var. *grisea*; **incl.** *Agave grisea* var. *cienfuegosana* Trelease (1913); **incl.** *Agave grisea* var. *obesispina* Trelease (1913).

[2l] **Ros** solitary; **L** lanceolate, somewhat concave, 150 - 200 $\times$ 10 - 20 (-25) cm, green, passing into glaucous, or grey, rather dull, margins between the teeth from nearly straight to decidedly concave; marginal teeth gently curved, heavily triangular, sometimes wider or sublenticular at the **L** base, 2 - 3 (-5) mm, 15 - 25 (-45) mm apart; terminal **Sp** triquetrously conical or somewhat subulate, slightly curved, flattened or shallowly concave to or beyond the middle or becoming subinvolute, smooth, 1 - 1.5 (-2) cm, reddish-chestnut-brown or brown, decurrent for its length or more; **Inf** 6 - 8 m, 'paniculate', oblong, part-**Inf** in the upper $\frac{1}{2}$ of the **Inf**; **Fl** 40 - 55 mm; **Ov** oblong-fusiform, 20 - 30 mm; **Tep** golden-yellow, tube $\pm$ 8 mm, lobes 15 - 18 mm; **Fr** oblong, shortly stipitate and beaked, 4 $\times$ 2 cm.

A polymorphic species. Since the 2 varieties merely differ gradually and in addition appear to be connected by transitional forms (Berger 1915: 209), they are provisionally included in the synonymy here.

A. guadalajarana Trelease (CUSNH 23: 123, 1920). **T:** Mexico, Jalisco (*Pringle* 4473 [MO, K, MEXU, NY, US]). – **Lit:** McVaugh (1989). **D:** Mexico (Jalisco); grassy slopes of oak woodland, 1500 - 2000 m. **I:** Gentry (1982: 532).

[2i] **Ros** compact, small, 25 - 35 cm $\varnothing$, broader than tall, solitary, rarely suckering; **L** numerous, obovate to oblong, rigid, closely imbricate, obtuse, plane to incurved, 20 - 30 $\times$ 8 - 12 cm, inner **L** shiny but glaucous, outer **L** dull grey, margins nearly straight, upper part mamillate; upper marginal teeth 8 - 10 mm, remote, those from the middle of the lamina towards the base much smaller, 3 - 4 mm, reddish-brown to dusty grey, 5 - 10 mm apart; terminal **Sp** subulate, straight to sinuous, flat to shallowly hollowed above, roundly keeled below, 2.5 cm, greyish; **Inf** 4 - 5 m, 'paniculate', scape slender, part-**Inf** small, 15 - 20 in the upper $\frac{1}{2}$ of the **Inf**; **Fl** 60 mm; **Tep** slender, lobes much longer than the tube.

Distinct from all other members of Group *Parryanae* in its mamillate leaf margins and lax inflorescence (Gentry 1982: 531).

A. guerrenderensis (Matuda) G. D. Rowley (Repert. Pl. Succ. 26: 4, 1977). **T:** Mexico, Guerrero (*González Medrano & al.* s.n. [MEXU]). – **D:** Mexico (Guerrero); 1250 m. **I:** Cact. Suc. Mex. 20: 47, 1975.

$\equiv$ *Manfreda guerrenderensis* Matuda (1975).

[3a3] Rhizome fleshy, fasciculate; **L** 2 - 3, base subamplexicaul, lamina obovate-lanceolate, acute, entire, half-fleshy, gradually tapering towards a narrow petiole-like lower part $\pm$ 8 - 10 cm long and 2 mm broad, white-pubescent, 40 - 45 $\times$ 6 - 8 cm,

glaucous, plain green or spotted with spots towards the base; remains of **L** bases broadly triangular, latter fibrous, ± 4.5 cm; **Inf** glabrous, 1.2 - 1.5 m, scape spotted purplish towards the base, with few **Fl**; **Ped** short; **Fl** incl. **Ov** apparently ± 67 mm; **Ov** 3 mm $\varnothing$; **Tep** tube campanulate, lobes erect or spreading, ± 17 mm.

This species, which is only known from the type collection, is doubtfully distinct from *A. debilis* and differs mainly in its much broader leaves only. The sparse flower measurements given in the protologue remain unclear ("length of tube including ovary 5 cm") and need to be corroborated from the type material. Fruit data is lacking in the protologue, though the accompanying illustration shows a fruiting but apparently flowerless specimen. – The typification of this taxon was discussed by González Medrano (1991).

A. guiengola Gentry (Brittonia 12: 98-100, ill., 1960). **T:** Mexico, Oaxaca (Gentry 16436 [US, DES, MEXU]). – **Lit:** Ullrich (1991g). **D:** Mexico (Oaxaca: Cerro Guiengola); limestone, 100 - 1000 m, only known from the type locality. **I:** Gentry (1982: 90, 98-99). **Fig. III.d**

[1c] **Ros** open, mostly solitary; **L** few, mature ± 30 , ovate to ovate-lanceolate, openly ascending, short-acuminate, nearly plane above but briefly and narrowly channelled apically, light grey or white-glaucous, epidermis finely and densely papillate, margins variously serrate; marginal teeth flattened, blunt, fine or coarse, 1- to 2-cuspidate, dark brown; terminal **Sp** acicular, dark brown, not decurrent or decurrent for $\pm$ its own length in a horny margin; **Inf** erect, 1.6 - 2 m, 'spicate', flowering from near the base, part-**Inf** with 2 - 3 **Fl**; **Fl** inconspicuous, 33 - 35 mm; **Tep** pale yellow or yellowish-white.

A very distinct species esp. due to its broad thick white-glaucous leaves. The tubeless flowers place it in Group *Choritepalae*, but it differs from the 2 other species (*A. bracteosa*, *A. ellemeetiana*) geographically as well as in the shape and coloration of the toothed leaves (Gentry 1982: 97) and seed morphology (Ullrich 1991g). Ullrich (l.c.) therefore regards the Group *Choritepalae* as artificial.

A. guttata Jacobi & C. D. Bouché (Hamburg. Gart.- & Blumenzeit. 21: 190, 1865). – **Lit:** McVaugh (1989). **D:** Mexico (San Luis Potosí, Aguascalientes, Jalisco, Zacatecas, Durango); open sun, grassy roadsides, rocky fields, summit of hills, roadcuts, 1220 - 2440 m, flowers mid-July to late August. **I:** Desert Pl. Life 12: 174-175, 1940.

$\equiv$ *Manfreda guttata* (Jacobi & C. D. Bouché) Rose (1903) $\equiv$ *Polianthes guttata* (Jacobi & C. D. Bouché) Shinnars (1966); **incl.** *Agave protuberans* Engelmann ex Baker (1888) $\equiv$ *Leichtlinia protuberans* (Engelmann ex Baker) H. Ross (1893); **incl.** *Leichtlinia commutata* H. Ross (1896).

[3a3] Plants medium-sized to large (for Subgen.

Manfreda), reproducing vegetatively by buds from the storage rhizome and by spreading rhizomes producing a plantlet at the tip; rhizome bulbous to oblong, 1.8 - 4 $\times$ 1.3 - 3 cm; **R** half-fleshy; **L** 2 - 7 (-13 in cultivation), spreading or erect-spreading, lanceolate to lanceolate-elliptic, often narrowed towards the base, tip obtuse with a short firm point, channelled, undulate, semisucculent, (8-) 14 - 38 $\times$ (0.9-) 1.3 - 3.1 cm, glaucous, plain green or spotted with small or large and confluent green or dark brown spots; margins with a narrow white cartilaginous band sometimes streaked with red, minutely denticulate or erose; remains of **L** bases fibrous, fibres 3 - 6 cm; **Inf** (61-) 90 - 156 cm, 'spicate', flowering part crowded, (2.3-) 3 - 14 cm, with (2-) 4 - 25 (-33) **Fl**; **Ped** none or very short in the lower **Fl**; **Fl** nearly erect, with strong scent of cooked potatoes or onions; **Ov** cylindrical, 6 - 12 (-15) mm; **Tep** tube cylindrical to oval in cross section, slightly curved, short, 3 - 12 mm, lobes oblong, tightly revolute to coiled, (6-) 10 - 15 mm, greenish-yellow; **Fil** exceeding the tube by 20 - 29 (-41) mm, pale green, often speckled with brown; **Sty** at maturity longer than the **St** and arched upwards, exceeding the tube, pale greenish-white; **Sti** clavate, 3-lobed; **Fr** ellipsoid, 1.6 - 2.4 $\times$ 1 - 1.9 cm; **Se** 3 $\times$ 4 mm.

The round storage rhizome and the presence of spreading rhizomes, the denticulate-erose leaf margin, dense inflorescence, and the stubby flowers with exerted stamens and styles are diagnostic for this species (Verhoek-Williams 1975: 238).

A. gypsophila Gentry (Agaves Cont. North Amer., 510-512, ill., 1982). **T:** Mexico, Guerrero (*Floyed & Ryan* 103 [MICH, UC]). – **Lit:** McVaugh (1989); Ullrich (1991b). **D:** Mexico (Jalisco, Colima, Michoacán, Guerrero); calcareous or gypseous rocks, understory of lowland thorn forest, 300 - 1000 m.

[2j] **Ros** openly spreading, solitary; **L** few (20 - 30 in mature **Ros**), linear-lanceolate, generally arching, weak, brittle and with few fibres, thick, slightly narrowed near the base, deeply convex below, flat above, asperous, 45 - 100 (-110) $\times$ 7 - 12 cm, glaucous-grey, margins closely dentate with small prominences; marginal teeth weak, 1 - 2 mm, with small intermittent teeth; terminal **Sp** conical, very small, 0.5 - 1.5 cm, dark brown, not decurrent; **Inf** 2 - 3 m, 'paniculate', part-**Inf** relatively few, widely spreading, few-flowered, in the upper $\frac{1}{2}$ of the **Inf**, in cultivation bulbilliferous; **Fl** 30 - 35 mm (dried, relaxed); **Ov** fusiform, 18 - 20 mm, neck furrowed; **Tep** yellow, tube broadly funnel-shaped, 4 - 5 mm, lobes about equal, 10 - 11 mm.

A 'distinctive oddity' easily distinguished by its linear brittle grey leaves with close-set prominences and small teeth and spines (Gentry 1982: 512). Ullrich (1991b) is the first to record the species from Michoacán.

A. harrisii Trelease (Mem. Nation. Acad. Sci. 11:

34, t. 50-51, 1913). – **Lit:** Adams (1972). **D:** Jamaica; interior limestone plateau, ± 650 m.

[21] **Ros** solitary; **L** narrowly lanceolate, curved, gradually acute, nearly flat, $100 - 200 \times 15 - 35$ cm, rather glossy dark green, margins between the teeth straight or concave; marginal teeth straight or curved, narrowly triangular, scarcely 2 mm, 1 - 2 cm apart, often from the tops of green prominences; terminal **Sp** conical, somewhat flexuous or recurved, narrowly channelled towards the base, smooth, 1 - 1.5 cm, reddish-brown, glossy, not decurrent; **Inf** 8 - 10 m, 'paniculate', part-**Inf** with **Br** ± 60 cm; **Ped** rarely > 10 mm; **Fl** 45 - 50 mm; **Ov** fusiform, 25 - 30 mm, distinctly longer than the **Tep**; **Tep** ± 20 mm, yellow, tube open, 7 - 8 mm, lobes erect, 12 - 15 mm; **Fr** narrowly oblong, turbinate narrowed rather than stipitate, shortly beaked, $4.5 - 5 \times 1.5 - 2$ cm.

A. hauniensis J. B. Petersen (Bot. Tidsskr. 48: 158-159, 1947). **T:** Cult. BG Kobenhaven (*Anonymus* P1875/459 [C]). – **D:** Mexico (Guerrero, México, Morelos); lava fields, rocky slopes in oak woods or in full sun in glades, 700 - 2010 m, flowers in November.

= *Manfreda hauniensis* (J. B. Petersen) Verhoek-Williams (1978); **incl.** *Manfreda insignis* Matuda (1966); **incl.** *Manfreda malinaltenangensis* Matuda (1976).

[3a1?] Plants very large (for Subgen. *Manfreda*), reproducing vegetatively by lateral shoots from the storage rhizome, rhizome 7 cm $\varnothing$; **L** arching, linear-lanceolate, shallowly channelled, somewhat coriaceous, tip acute, with a long pungent point, (35-) 49 - 77 (-92) $\times 4 - 10.5$ cm, green, slightly glaucous on the lower face, margins cartilaginous, hyaline, sometimes streaked with dark green or purple, irregularly denticulate to denticulate-erose, teeth small and simple to large and bifid to trifid; **Inf** 2 - 3.5 (-3.8) m, 'spicate', flowering part dense, (22.5-) 41.5 cm or more, with 23 - 40 or more **Fl**; **Fl** sessile, erect-spreading, fleshy; **Ov** ellipsoid to ovoid, 12 - 22 mm; **Tep** tube funnel-shaped, nearly straight, 14 - 20 mm, lobes spreading, oblong, cucullate, 20 - 27 (35 - 46 in cult.) mm, yellowish-green or also dark red within; **Fil** spreading, reddish; **Sty** exerted from the tube for 72 - 108 mm, reddish-brown; **Sti** clavate, trigonous; **Fr** ovoid to oblong, rounded below, $\pm 3 \times 1.2 - 2$ cm.

Best distinguished within Subgen. *Manfreda* by the very large size of the plants and the long pungent point terminating the leaves (Verhoek-Williams 1975: 229). *Manfreda malinaltenangensis*, which is compared with *M. insignis* in the protologue, falls well within the range of *A. hauniensis* and is thus here placed in its synonymy.

A. havardiana Trelease (Annual Rep. Missouri Bot. Gard. 22: 91, 1912). **T:** USA, Texas (*Havard* s.n. [MO]). – **D:** USA (Texas: Big Bend region),

Mexico (N Chihuahua, N Coahuila); rocky slopes in grassland, frequently on limestone, 1240 - 2000 m. **I:** Gentry (1982: 522, 527, 533). **Fig. III.e**

[2i] **Ros** rather open, $0.5 - 0.8 \times 1 - 1.6$ m, mostly solitary, suckering sparingly; **L** ovate-acuminate, thick, rigid, broadest at the clasping base, slightly narrowed above the base, widest below the middle, rounded below, concave above, $30 - 60 \times 15 - 20$ cm, rarely larger, glaucous-grey to light green, occasionally yellowish; uppermost marginal teeth $\pm$ straight, other teeth reflexed, numerous, larger teeth towards the **L** tip, mostly 7 - 10 mm, gradually diminishing downwards, 1.5 - 2 cm apart; terminal **Sp** stout, straight to sinuous, roundedly keeled below, broadly grooved above, mostly 3 - 5 (-8 or even 10) cm, dark brown to greyish, long decurrent, sometimes as a complete horny margin; **Inf** 2 - 4 m, 'paniculate', broad, open, part-**Inf** large, 12 - 20; **Fl** 68 - 88 mm; **Ov** 30 - 40 mm, green, neck short, thick; **Tep** yellow, tube deeply funnel-shaped, 14 - 22 mm, lobes unequal, 18 - 24 mm.

Distinguished within Group *Parryanae* by the very broad-based acuminate leaves with reflexed teeth, and tepals forming a deep tube and with relatively short lobes (Gentry 1982: 535).

A. hiemiflora Gentry (Agaves Cont. North Amer., 480-482, ill., 1982). **T:** Guatemala (Gentry 23640 [US, DES, MEXU]). – **D:** Mexico (Chiapas), Guatemala.

[2k] **Ros** compact, solitary; **L** 50 - 90, lanceolate, openly spreading, rather softly fleshy, gradually narrowed and thickened towards the base, acuminate, plane to slightly hollowed above, mostly $30 - 55 \times 10 - 15$ cm, light grey-glaucous to pale green, margins undulate to deeply crenate; larger marginal teeth 5 - 8 mm in the middle of the lamina, 1 - 3 cm apart, light to dark brown, or teeth smaller and on undulate margins, on prominences, slender cusps variously curved up or down; terminal **Sp** slender or thick, sinuous or contorted to straight, openly grooved to flat above, generally 2 - 4 cm; **Inf** 4 - 5 m, 'paniculate', slender, narrow, part-**Inf** small, 20 - 30 in the upper $\frac{1}{2} - \frac{2}{3}$ of the **Inf**; **Fl** slender, 50 - 70 mm; **Ov** 25 - 40 mm, neck short, a little constricted; **Tep** in bud sometimes red, opening yellow, tube funnel-shaped, 8 - 13 mm, lobes unequal, 16 - 23 mm.

A highland relative of *A. seemanniana* and *A. congesta* (Gentry 1982: 480).

A. hookeri Jacobi (Hamburg. Gart.- & Blumenzeit. 22(4): 168, 1866). **Nom. illeg.**, Art. 53.1. **T** [neo]: Ex cult. (*Brown* s.n. [K]). – **Lit:** McVaugh (1989). **D:** Mexico (Jalisco, Michoacán, Guerrero); apparently cultivated only or as spontaneous escape (?). **I:** Gentry (1982: 325, 338-339).

[2c] Stem short, thick; **Ros** large, up to 2 m, solitary; **L** lanceolate, arching in age, thickly fleshy, gradually narrowed toward base and tip, generally

concave above, 120 - 175 × 20 - 25 cm, glaucous to green or yellow-green, margins undulate to crenate, esp. in the middle of the lamina, nearly straight below with small teeth; marginal teeth straight or curved, 8 - 12 mm (middle of the lamina), dark brown to greyish-brown, 2 - 5 cm apart, with few smaller intermittent teeth, much reduced and closely spaced towards the base, broadly based on fleshy prominences; terminal **Sp** subulate, 3.5 - 6 cm, edges decurrent as smooth horny **L** border for 15 - 20 cm; **Inf** 7 - 8 m, 'paniculate', part-**Inf** compact, 20 - 40 in the upper ½ of the **Inf**; **Ped** long; **Fl** slender, 63 - 80 mm; **Ov** 34 - 41 mm, neck long, constricted; **Tep** in bud red to pink, opening yellow, lobes red to pink, tube 5 - 8 mm, lobes unequal, 28 - 32 mm.

Recognizable among the species of Group *Crenatae* by its large size, the glaucous leaves with long-decurrent spine-bases, the short flower tube and very long tepal lobes (Gentry 1982: 340). The name unfortunately is an illegitimate homonym of *A. hookeri* Koch 1865 and must be proposed for conservation.

A. horrida Lemaire ex Jacobi (Hamburg. Gart.- & Blumenzeit. 22: 64, 1866). **T** [neo]: Mexico, Morelos (*Pringle* 8206 [US, NY]). – **D**: S Mexico.

A. horrida ssp. **horrida** – **D**: Mexico (San Luis Potosí, México, Morelos); volcanic rocks and mountains. **I**: Gentry (1982: 145).

Incl. *Agave horrida* var. *latifrons* hort. ex Besau-
cèle (s.a.); **incl.** *Agave horrida* var. *monstruosa* hort.
ex Besau-
cèle (s.a.); **incl.** *Agave horrida* var. *recur-
vispina* hort. ex Besau-
cèle (s.a.); **incl.** *Agave horri-
da* var. *viridis* hort. ex Besau-
cèle (s.a.); **incl.** *Agave
regelii* hort. ex Besau-
cèle (s.a.); **incl.** *Agave grandi-
dentata* Hort. Belg. ex Jacobi (1866); **incl.** *Agave
maigretiana* Jacobi (1866); **incl.** *Agave gilbeyi*
Hort. Haage & Schmidt (1873) ≡ *Agave horrida*
var. *gilbeyi* (Hort. Haage & Schmidt) Baker (1877);
incl. *Agave horrida* var. *macrodonata* Baker (1877);
incl. *Agave desmetiana* hort. ex Baker (1877) (*nom.
illeg.*, Art. 53.1); **incl.** *Agave regeliana* hort. ex Ba-
ker (1877) (*nom. illeg.*, Art. 53.1); **incl.** *Agave
artichaut* Hort. C. Besserer ex A. Berger (1915);
incl. *Agave killischkii* hort. ex A. Berger (1915).

[1g] **Ros** compact, small, solitary; **L** 80 - 100 in
mature **Ros**, ovate to elliptic-lanceolate, patulous,
rigidly thick-fleshy, slightly narrowed above the
base, short-acuminate, convex below, plane to hol-
lowed above, generally 18 - 35 × 4 - 7.5 cm, yellow-
ish-green to green, margins thickly horny, straight
to sinuous between the teeth; marginal teeth straight
to variously curved, broadly flattened at the base,
even hooked, large, generally 10 - 15 mm, rarely
much smaller, light grey, 5 - 10 mm apart, continu-
ing to near the base of the terminal **Sp**; terminal **Sp**
semicircular to subdeltoid in cross-section, very
pungent, flattened rather than grooved above, 2.5 -

4 cm; **Inf** 2 - 2.5 m, 'spicate', slender, scape 1 - 1.5
m, part-**Inf** with 1 - 2 **Fl**; **Ped** slender, 4 - 8 mm; **Fl**
35 - 40 mm; **Ov** fusiform, 17 - 20 mm, neck con-
stricted, smooth or slightly grooved; **Tep** dark pur-
ple red or yellow, tube shortly funnel-shaped, 3 - 5
mm, lobes equal, 15 - 16 mm.

Distinguished from the closely related *A. ghies-
breghtii* by larger, more numerous marginal teeth
continuing nearly to the base of the terminal spine,
but sometimes hardly separable (Gentry 1982: 146).

A. horrida ssp. **perotensis** B. Ullrich (Cact. Suc.
Mex. 35(4): 80, ill. (p. 96), 1990). **T**: Mexico, Ve-
racruz (*Gentry & al.* 20417 [US, DES, MEXU]). –
D: Mexico (N Puebla, C Veracruz). **Fig. III.f**

[1g] Differs from ssp. *horrida*: **Ros** small to me-
dium-sized; **L** 25 - 40 × 5 - 8 cm, pale green to
green; marginal teeth variable, straight to curved or
flexuous, frequently slanted downwards and curved,
< 1 cm or 2 - 3 cm apart; terminal **Sp** conical to
subulate, 3 - 5 cm, broadly decurrent; **Inf** long, tap-
ering, 3 - 5 m, densely flowered in the upper ¾ in
spiralling sequence, part-**Inf** with geminate **Fl**.

Plants belonging to this taxon were previously
misinterpreted as *A. obscura* (see there).

A. howardii (Verhoek-Williams) Thiede & Eggli
(KuaS 50(5): 112, 1999). **T**: Mexico, Colima (*Ho-
ward & al.* 72-70 [RSA]). – **Lit**: Verhoek-Williams
(1976: with ill.); McVaugh (1989). **D**: Mexico (Ja-
lisco, Colima); well-drained soils in partial shade in
oak or tropical deciduous forests, 1000 - 1100 m,
flowers July to August.

≡ *Polianthes howardii* Verhoek-Williams (1976).

[3b1] Plants glabrous; **R** fleshy; **L** 5 - 6, in a basal
Ros from a fibrous-coated bulb, erect-spreading,
narrowly oblanceolate to linear, tip acute or mucro-
nate, 22 - 27 (-36) × (1-) 1.5 - 2.5 cm, glossy green,
lower face sometimes flecked with magenta, mar-
gins entire; **Inf** 0.6 - 1.1 m, 'spicate', flowering part
20 - 70 cm, with 13 - 30 widely spaced solitary se-
mi-pendent **Fl**; **Ped** erect, 17 - 29 (-50) mm; **Ov** 9 -
16 (-19) mm; **Tep** glaucous, outer face coral-red at
the base, grading to green in the distal ½, irregularly
streaked with yellow, inner face greenish-yellow,
often with maroon stripes in the tube, tube nearly
straight, at a slight angle with the **Ov**, mouth
slightly oblique, 3 - 5 mm Ø, lobes rounded,
slightly flaring, 1.5 - 3 mm; **St** included or **Anth** ex-
serted for 2 mm; **Sty** white, with 3 reflexed lobes;
Fr globose, 0.8 - 1 cm Ø.

A. hurteri Trelease (Trans. Acad. Sci. St. Louis
23(3): 136, t. 8-10, 1915). **T**: Guatemala (*Trelease*
3 [ILL]). – **D**: NW Guatemala; mountains in the
pine-oak forest zone, 1800 - 3300 m. **I**: Gentry
(1982: 483-484).

Incl. *Agave samalana* Trelease (1915).

[2k] Stem thick, short; **Ros** rather open, 1 - 1.8 ×
2 - 3 m, solitary; **L** numerous, lanceolate, out-

curving to ascending, broadest at or above the middle, acuminate, plane to slightly hollowed above, slightly rough above, more asperous below, mostly 70 - 130 × 15 - 22 cm, light glaucous to pale green and yellow-green, margins ± straight; marginal teeth straight to curved, small to moderate, larger teeth 3 - 8 mm (middle of the lamina), dark brown, 1 - 3 cm apart, rarely smaller and closer or margins quite toothless; terminal **Sp** subulate, broad at the base, openly grooved above, 4 - 6 cm, dark brown to greyish-brown; **Inf** stout, narrow, 5 - 7 m, 'paniculate', scape short, part-**Inf** rounded, 30 - 45 in the upper ¾ of the **Inf**; **Fl** 55 - 85 mm; **Ov** cylindrical, 30 - 45 mm, neck short; **Tep** greenish-yellow to purple-tinged, tube funnel-shaped to angulate-cylindrical, 9 - 15 mm, lobes unequal, outer 16 - 28 mm.

A variable complex, usually distinguishable from other members of the Group *Guatemalenses* with rounded part-inflorescences by its larger many-leaved rosettes and consistently longer stalked part-inflorescences (Gentry 1982: 485).

A. impressa Gentry (Agaves Cont. North Amer., 146-149, ill., 1982). **T**: Mexico, Sinaloa (Gentry 23366 [US, ARIZ, DES, MEXU]). – **Lit**: McVaugh (1989). **D**: Mexico (Sinaloa, Nayarit); volcanic rocks in the hot lowlands.

[1g] **Ros** subcaulescent, openly spreading, small to medium-sized, solitary; **L** linear to lanceolate, rigidly spreading, thickly fleshy with viscid adhesive sap and few fibres, convex below, plane to hollowed above, 40 - 60 × 5 - 9 cm, pale yellowish-green, with conspicuous white imprints from the central bud on the upper face, margins horny, continuous, straight to sinuous between the teeth, 2 - 3 mm wide, light to dark grey; marginal teeth straight or slightly curved, flattened, regular, blunt, mostly 3 - 5 mm, grey like the **L** margin, 1 - 1.5 cm apart; terminal **Sp** subulate, stout, rounded below, flat and broad at the base above, rarely channelled, sharp to blunt at the tip, 3 - 5 cm; **Inf** erect, 2 - 3 m, 'spicate', flowering from near the base, part-**Inf** with 2 - 3 **Fl**; **Ped** slender, 2 - 2.5 cm; **Fl** 35 - 40 mm; **Ov** slender, fusiform, 17 - 20 mm; **Tep** green in bud, opening yellow, tube short, spreading, 1.5 - 2 mm, lobes equal, 17 - 18 mm.

A distinctive species without close relatives. Its placement within Group *Marginatae* is for convenience only (Gentry 1982: 148).

A. inaequidens Koch (Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 3: 28, 1860). **T** [neo]: Mexico, México (Gentry & al. 19612 [US, DES, MEXU, MICH]). – **D**: C Mexico.

A. inaequidens ssp. *barrancensis* Gentry (Agaves Cont. North Amer., 342-344, ill., 1982). **T**: Mexico, Durango (Gentry & Arguelles 22282 [US, ME-

XU, DES]). – **D**: Mexico (Durango); mountainous slopes of deep barrancas in the pine-oak forest region, 1800 - 2400 m.

[2c] Differs from ssp. *inaequidens*: **Ros** large, 1.5 - 2 × 3 - 3.5 m; **L** mostly longer and narrower, 100 - 170 (-200) × 10 - 16 cm, margins nearly straight to undulate; terminal **Sp** subulate-acicular and longer, 4 - 6 cm; **Inf** broader and shorter, part-**Inf** 20 - 30, broadly spreading.

A. inaequidens ssp. *inaequidens* – **D**: Mexico (Jalisco, Hidalgo, Michoacán, México, D.F., Morelos, Puebla); rocky slopes in pine-oak forest, mostly 1800 - 2400 m. **I**: Gentry (1982: 325, 341).

Incl. *Agave amoena* hort. ex Lemaire ex Jacobi (s.a.); **incl.** *Agave mescal* Koch (1865); **incl.** *Agave crenata* Jacobi (1866); **incl.** *Agave megalacantha* Hemslay (1880); **incl.** *Agave reginae* hort. ex A. Berger (1912); **incl.** *Agave heterodon* hort. ex A. Berger (1915); **incl.** *Agave bourgaei* Trelease (1920).

[2c] Stem short; **Ros** openly spreading, medium-sized to large, solitary; **L** variable, broadly or narrowly lanceolate or oblanceolate, ascending to outcurving, thickly fleshy, concave above, esp. towards the rounded base, mostly 75 - 150 × 11 - 21 cm, light green to yellow-green, rarely faintly glaucous, margins undulate to repand and crenate; marginal teeth dimorphic, straight or variously curved, the flattened bases longer than the height of the teeth, commonly 8 - 10 mm long, chestnut-brown to dark brown, 2.5 - 4 cm apart, with few smaller intermittent teeth, larger teeth on broad prominences; terminal **Sp** stout, broadly deeply channelled above, 2.5 - 5.5 cm, dark brown, protruding into the **L** tissue below, sharply decurrent to the uppermost marginal teeth; **Inf** 5 - 8 m, 'paniculate', narrow, scape short, part-**Inf** compact, 30 - 50 in the upper ½ of the **Inf**; **Fl** 60 - 90 mm; **Ov** 30 - 40 mm, neck short; **Tep** reddish-purple, opening yellow, lobes reddish, tube 5 - 12 (-15) mm, lobes unequal, 25 - 30 (-34) mm.

Best distinguished from the closely related *A. hookeri* from the same region by its bright yellowish-green leaves (Gentry 1982: 341).

A. inaguensis Trelease (Mem. Nation. Acad. Sci. 11: 47, t. 103-105, 1913). **T** [syn]: Bahamas, Little Inagua (Nash & Taylor 342 etc. [MO]). – **Lit**: Correll & Correll (1982). **D**: Bahamas (Little Inagua, Caicos Islands); open sandy flats and rocky dwarf coastal coppices.

[2p] **Ros** caespitose, freely suckering; **L** oblong or lanceolate, rather abruptly acute and flat, sometimes conduplicate, 40 - 100 × 6 - 9 cm, typically white-glaucous; marginal teeth more recurved and less uniform than in *A. nashii*, very narrowly triangular, 1 - 2 mm, almost continuously joined by a narrow blackish border, 3 - 9 mm apart; terminal **Sp** 2 - 3 cm, dark brown; **Inf** 4 - 5 m, 'paniculate',

part-**Inf** on slender outcurved **Br** in the upper $\frac{1}{4}$ of the **Inf**; **Ped** 5 - 10 mm; **Fl** $\pm$ 50 mm; **Ov** subfusiform, 25 - 30 mm; **Tep** 15 - 17 $\times$ $\pm$ 5 mm, yellow, tube open, $\pm$ 5 mm; **Fr** oblong-ellipsoid, 3 - 4 cm, broadly and shortly stipitate and beaked.

According to the protologue with the habit of *A. nashii*.

A. indagatorum Trelease (Mem. Nation. Acad. Sci. 11: 42, t. 92, 1913). **T**: Bahamas, Watling Island (Britton & Millspaugh 6155 [NY]). – **Lit**: Correll & Correll (1982). **D**: Bahamas (Watling Island); rocky soil in coastal coppices.

[2n] Acaulescent; **Ros** solitary; **L** lanceolate, gradually acute, somewhat concave, 150 - 250 $\times$ 20 - 25 cm, somewhat greyish and at first very glaucous beneath, margins between the teeth straight, somewhat membranous, at first slightly pink; marginal teeth straight or slightly recurved, narrowly triangular, not lenticular at the base, $\pm$ 1 mm, 5 - 12 mm apart; terminal **Sp** conical, nearly straight, involutely grooved to the middle, smooth, $\pm$ 1.2 cm, chestnut-brown, rather glossy, decurrent for about its own length; **Inf** to $\pm$ 9 m, 'paniculate', reportedly bulbilliferous; **Ped** 15 - 20 mm; **Fl** $\pm$ 55 mm; **Ov** ellipsoid, 20 - 25 mm, extended as a neck into the tube; **Tep** $\pm$ 20 mm, yellow, tube rather open, $\pm$ 6 mm; **Fr** narrowly oblong, thickly stipitate, acuminate pointed, 3.5 - 6 $\times$ $\pm$ 2 cm.

A. intermixta Trelease (Mem. Nation. Acad. Sci. 11: 32, t. 64, 1913). **T**: Hispaniola, Haiti (Parry s.n. [Herb. Engelmann [MO?]]). – **D**: Haiti.

[2l] **Ros** and **L** unknown (!); **Ped** slender, 15 - 25 mm; **Fl** $\pm$ 65 mm, congested at the ends of the part-**Inf**; **Ov** elongated-fusiform, 35 mm, longer than the **Tep**; **Tep** yellow (?), tube narrowly conical, $\pm$ 8 mm, lobes 20 $\times$ 4 mm; **Fl** inserted almost at the throat, 30 mm; **Fr** rather broadly pear-shaped and oblong, stipitate and beaked, 4 $\times$ 2 cm; **Se** 8 $\times$ 5 mm.

See the note for *A. antillarum*.

A. involuta (McVaugh) Thiede & Eggli (KuaS 50(5): 110, 1999). **T**: Mexico, Jalisco (*Bauml & Voss* 1466 [RSA, MICH]). – **D**: Mexico (N Jalisco); grassy openings and hillsides in dry oak or pine-oak forest, 1500 - 2000 m, flowers March to April.

$\equiv$ *Manfreda involuta* McVaugh (1989).

[3a3] Plants 85 - 140 cm; **L** up to 10 or more, linear, tightly folded and often appearing tubular, 30 - 50 $\times$ 0.2 - 0.5 cm, margins (and veins of the lower face) papillose (sometimes obscurely so); **Inf** 'spicate', flowering part 10 - 20 cm, with 3 - 7 **Fl**; **Fl** sessile, ascending at maturity; **Ov** ellipsoid, 6 - 9 mm; **Tep** greenish with purple cast, drying glaucous greenish-purple, tube narrowly funnel-shaped, slenderly cylindrical towards the base but not constricted there, 7 - 13 mm, lobes spreading-ascending

or somewhat recurved, 8 - 10 mm, usually shorter than the tube; **Fl** apparently purplish, surpassing the tube by $\pm$ 20 mm; **Sty** longer than the **St**; **Fr** and **Se** not known.

According to the protologue (McVaugh 1989: 232-233) known from 2 collections only and of uncertain affinities due to its apparently unique combination of a very early flowering season, very narrow involute leaves, and slender tepal tubes longer than the lobes. With its papillate leaf margins, the ovary protruding into the tube and the cylindrical tube not narrowed above the ovary, the taxon fits well into the *A. guttata* Subgroup, however.

A. isthmensis García-Mendoza & Palma Cruz (Sida 15(4): 565-568, ill., 1993). **T**: Mexico, Chiapas (*García-Mendoza & al.* 4177 [MEXU, BRIT/SMU, DES, ENCB]). – **D**: Mexico (Oaxaca, Chiapas).

[2k] **Ros** compact, 17 - 32 $\times$ 25 - 36 cm, young plants with numerous rhizomatous offsets, adult plants with axillar offsets; **L** 84 - 132, ovate, narrowed towards the base, apex truncate, concave, scabrous below, 8 - 10 $\times$ 5 - 8 cm, margins deeply crenate; marginal teeth deltoid, (2-) 3 - 4 mm, brown-reddish, < 1 cm apart; terminal **Sp** sinuous, slightly applanate, 1.2 - 1.5 cm, brown-reddish, decurrent for 6 - 10 mm; **Inf** 1.7 - 2.2 m, 'paniculate', oblong, part-**Inf** (6-) 20 - 25; **Ped** 3 - 4 mm; **Fl** succulent, 38 - 46 mm; **Ov** 16 - 21 mm; **Tep** yellow, tube funnel-shaped, trisulcate, 4 - 5 mm, lobes 19 - 21 mm.

According to the protologue closest to *A. potato-rum* and *A. seemanniana* (as *A. pygmaea*) and distinct by its compact small many-leaved rosettes with glaucous leaves with scabrous lower face and the rhizomatous as well as axillar offsetting.

A. jaiboli Gentry (US Dept. Agric. Handb. 399: 89-94, ill., 1972). **T**: Mexico, Sonora (*Gentry* 21177 [US]). – **D**: Mexico (Sonora); short-tree forest and oak woodland, 300 - 1000 m. **I**: Gentry (1982: 325, 345-346).

[2c] **Ros** usually open, 0.6 - 1 $\times$ 1.4 - 2 m, solitary; **L** linear to lanceolate, usually straightly ascending to spreading, sometimes incurved, widest at or above the middle, gradually narrowed below, long-acuminate, plane to conduplicate, 60 - 100 $\times$ 8 - 12 cm, green to yellowish-green, margins not or narrowly horny, decurrent from the **Sp** base for less than the **Sp** length; marginal teeth curved down- or upwards, 5 - 8 mm, reddish-brown, larger teeth $\pm$ 2 - 3 cm apart, on small regular prominences, smaller intermittent teeth 1 to several, 1 - 4 mm; terminal **Sp** subulate, terete, smooth, 3 - 4 cm, reddish-brown, shiny; **Inf** 6 - 8 m, 'paniculate', part-**Inf** small, diffuse, 12 - 15 in the upper $\frac{1}{2}$ - $\frac{1}{3}$ of the **Inf**, with 4 **Fl**; **Ped** short; **Fl** $\pm$ 60 mm; **Ov** 25 - 30 mm the 3 - 4 mm long neck, green; **Tep** yellow, flushed ferruginous, tube funnel-shaped, 9 - 11 mm, lobes unequal, 22 - 23 mm.

Distinguished within Group *Crenatae* by its narrow almost ensiform leaves (Gentry 1982: 345).

A. jaliscana (Rose) A. Berger (Agaven, 38, 1915). **T** [lecto]: Mexico, Jalisco (*Pringle* 1850 [US, BM, BR, F, G, GH, LE, M, NY, P, VT]). – **D**: Mexico (Sonora, Jalisco, Michoacán); loose black loam or rocks, in pine-oak forests and on grassy slopes, flowers early November to early April.

≡ *Manfreda jaliscana* Rose (1903) ≡ *Polianthes jaliscana* (Rose) Shinnars (1966).

[3a2] Plants medium-sized (for Subgen. *Manfreda*), solitary or caespitose; **R** half-fleshy; storage rhizome oblong, 1.3 - 2.2 cm Ø, spreading rhizomes cylindrical; **L** 5 - 10, spreading, linear, channelled, tip acute, with a short point, herbaceous, minutely scattered-papillate, (41-) 49 - 78 (-93) × 0.6 - 1.4 (-2.8) cm, green, unspotted (dried); margins with very narrow hyaline band, minutely papillate (at 12.5× magnification); remains of **L** bases separating into stiff fibres, 4 - 7 cm; **Inf** 1 - 1.55 m, 'spicate', flowering part elongate, semidense, 11 - 38 (-42) cm, with 11 - 40 sessile or occasionally shortly pedicellate **Fl**; mature **Fl** nearly erect; **Ov** narrowly ellipsoid, (6-) 8 - 13 (-16) mm, with a neck; **Tep** tube narrowly funnel-shaped, straight, slightly constricted above the **Ov**, 4 - 10 mm, lobes oblong, narrow, recurved, 9 - 17 mm; **Sty** exceeding the tube by (56-) 62 - 84 (-98) mm; **Sti** clavate, trigonous, deeply furrowed; **Fr** globose to oblong, 1.1 - 2.7 × 1.2 - 1.7 cm; **Se** 3 - 4 × 4 - 6 mm.

Easy to recognize in flower by its long-exserted stamens, the short tepal tube and long lobes. The very long narrow leaves with papillose margins are also characteristic (McVaugh 1989).

A. jarucoensis A. Álvarez (Revista Jard. Bot. Nac. Univ. Habana 1(1): 5-11, 1981). **T**: Cuba (Álvarez 41680 [HAJB]). – **Lit**: Álvarez de Zayas (1985: with ill.). **D**: W Cuba; limestone rocks and cliffs.

[2m] **Ros** solitary; **L** many, lanceolate, weak, fleshy, coriaceous, slightly concave in the lower ⅓, 100 - 120 × 12 - 16 cm, green, slightly opaque, margins straight; marginal teeth triangular, straight or weakly curved towards the **L** base, 1 - 4 mm, castaneous-reddish, base reddish, 4 - 15 mm apart; terminal **Sp** acicular, straight, pungent, 1.7 - 2.2 cm, slightly lustrous, chestnut-brown to grey, not decurrent; **Inf** 2 - 4 m, 'paniculate', part-**Inf** tripartite, up to 45 cm; **Ped** 5 - 15 mm; **Fl** 48 - 60 mm; **Ov** subcylindrical or fusiform, 18 - 24 mm; **Tep** greenish-yellow, tube 5 - 7 mm, lobes 13 - 16 mm; **Fr** oblong to nearly rounded, shortly apiculate, walls thick, 22 - 34 × 15 - 16 mm.

According to the protologue similar to *A. papyrocarpa*, but differing in its more robust habit, larger flowers, and thick fruit walls.

A. karatto Miller (Gard. Dict., Ed. 8, no. 6, 1768). **T** [neo]: St. Kitts (*Britton & al.* s.n. [NY]). – **D**:

Windward Islands (Anguilla, Antigua, Barbuda, La Désirade, Montserrat, Nevis, Saba, St. Eustatius, St. Kitts, St. Martin). **I**: KuaS 48: 98-99, 1997.

Incl. *Agave keratto* Haworth (1819) (*nom. inval.*, Art. 61.1); **incl.** *Agave salm-dyckii* Baker (1877); **incl.** *Furcraea gigantea* Boldingh (1909) (*nom. illeg.*, Art. 53.1); **incl.** *Agave nevidis* Trelease (1913); **incl.** *Agave obducta* Trelease (1913); **incl.** *Agave scheuermaniana* Trelease (1913); **incl.** *Agave trankeera* Trelease (1913); **incl.** *Agave vangrolae* Trelease (1913).

[2o] **Ros** solitary; **L** lanceolate, erect, arching, acute, concave above, 130 - 175 × ± 20 cm, (greyish-) green, rather glossy (or dull), margins nearly straight or shallowly concave, at first reddish; marginal teeth straight or variously curved or reflexed, triangular, sometimes with lenticular bases, 2 - 3 mm, brownish, 5 - 15 (-20) mm apart; terminal **Sp** grooved, smooth, polished at the tip, 1 - 1.5 cm, black, ultimate apex recurved-mucronate, 3 - 4 mm, decurrent, dorsally deeply immersed into the green **L** tissue; **Inf** 5 - 10 m, 'paniculate', oblong, part-**Inf** spreading, in the upper ⅓ of the **Inf**, freely bulbiliferous; **Fl** 60 - 65 mm, often aborting; **Ov** subfusiform, 30 - 35 mm; **Tep** golden-yellow, tube openly conical, 7 mm deep, lobes 22 mm; **Fr** broadly oblong, stipitate and short-beaked, to 4.5 × 2 cm, basal stalk 2 - 3 mm.

The broader circumscription of the species here applied follows Hummelinck (1938), Hummelinck (1987) and Hummelinck (1993) and includes several species separated from *A. karatto* by Trelease, some of which were still upheld by recent authors such as Howard & al. (1979).

A. karwinskii Zuccarini (Flora 15: 2(Beiblatt 2): 98, 1832). **T** [neo]: Mexico, Oaxaca (Gentry 12049 [US, DES, MEXU, MICH]). – **D**: Mexico (Puebla, Veracruz, Oaxaca); arid regions, 1550 - 1850 m. **I**: Gentry (1982: 555, 578).

Incl. *Agave laxa* Salm-Dyck (1834); **incl.** *Agave karwinskiana* Herbert (1837); **incl.** *Agave corderoyi* Baker (1877); **incl.** *Agave bakeri* Ross (1894).

[2f] Arborescent, stem 2 - 3 m, apparently forming clonal colonies with spreading rhizomes, **Ros** extending down the stem from the stem tip with **L** reflexing along the stems with age; **L** linear-lanceolate, ascending to radiately spreading, narrowed and thickened towards the base, acuminate, involute towards the base of the terminal **Sp**, convex below, guttered or concave above, 40 - 65 × 3 - 7 cm, green, margins straight; marginal teeth delicate, nearly straight to cuspidate and flexuous, pyramidal, 3 - 5 mm (middle of the lamina), dark brown, 2 - 4 cm apart; terminal **Sp** variable, subulate or conical with thickened base, 1.5 - 4 cm, dark brown to greyish and corroding at the base, decurrent or not; **Inf** ± 3 - 3.5 m, 'paniculate', openly diffuse, oval, part-**Inf** 10 - 15 in the upper ⅓ of the **Inf**; **Fl** small, 45 - 57 mm; **Ov** angularly cylindrical, slightly 6-

grooved, 20 - 30 mm, neck short; **Tep** greenish to pale yellow, with ferruginous tinge, tube 10 - 11 mm, lobes unequal, 11 - 19 mm.

Easily recognized by its stem-forming tall habit with relatively small leaves and small flowers (Gentry 1982: 579).

A. kerchovei Lemaire (Ill. Hort. 11: 64, 1864). **T**: [lecto - icono]: US. - **D**: Mexico (Hidalgo, Puebla, Oaxaca), semi-arid highlands, 1400 - 1875 m. **I**: Gentry (1982: 126, 150). **Fig. IV.c**

≡ *Agave poselgeri* var. *kerchovei* (Lemaire) A. Terracciano (1885); **incl.** *Agave kerchovei* var. *brevifolia* hort. ex Besaucèle (s.a.); **incl.** *Agave kerchovei* var. *glauca* hort. ex Besaucèle (s.a.); **incl.** *Agave kerchovei* var. *inermis* Ortgies (s.a.); **incl.** *Agave kerchovei* var. *miniata* hort. ex Besaucèle (s.a.); **incl.** *Agave kerchovei* var. *variegata* hort. ex Besaucèle (s.a.); **incl.** *Agave beaucarnei* Lemaire (1864); **incl.** *Agave kerchovei* var. *diplacantha* Lemaire (1864); **incl.** *Agave kerchovei* var. *distans* Lemaire (1864); **incl.** *Agave kerchovei* var. *macrodonata* Lemaire (1864); **incl.** *Agave kerchovei* var. *pectinata* Baker (1877); **incl.** *Agave horrida* Hort. A. Berger (1898) (*nom. illeg.*, Art. 53.1); **incl.** *Agave expatriata* Rose (1900); **incl.** *Agave convallis* Trelease (1920); **incl.** *Agave dissimulans* Trelease (1920); **incl.** *Agave inopinabilis* Trelease (1920).

[1g] Stem short; **Ros** openly spreading, medium-sized, solitary or caespitose, branching commonly from the lower **L** axils; **L** 80 - 100 and more in mature **Ros**, generally lanceolate, straight to slightly curved, rigid, thick at the base, tip long-acuminate, convex below, plane to hollowed above, 40 - 100 (-125) × 5 - 12 cm, light yellowish-green to green, rarely pruinose, margins generally thick and horny, continuous and straight; marginal teeth variable, straight to variously curved, broadly flattened, larger teeth 8 - 15 mm, 2 - 5 (-7) cm apart, smaller teeth irregularly occurring, grey, margins rarely completely and **L** tip generally toothless; terminal **Sp** stout, deeply channelled above, 3 - 6 cm, brown to grey; **Inf** 2.5 - 5 m, 'spicate', densely flowered in the upper ½ - ⅔; **Fl** 38 - 46 mm; **Ov** fusiform, 18 - 21 mm, neck constricted; **Tep** greenish to purplish, tube openly spreading, 4 - 6 mm, lobes subequal, 15 - 20 mm. - *Cytology*: 2n = 120.

Typically easily distinguishable by the long lanceolate leaves prominently armed with large variable remotely spaced teeth, usually, but not always, lacking along the acuminate apex. The taxon is apparently closely related to *A. ghiesbreghtii* (Gentry 1982: 152).

A. lagunae Trelease (Trans. Acad. Sci. St. Louis 23(3): 143, pl. 21, 1915). **T**: Guatemala (*Trelease* 10 [ILL]). - **D**: Guatemala; mesophytic mountain forest, 1000 m, only known from the region of the type locality.

[2k] **Ros** openly spreading, medium-sized, solitary; **L** few, linear to lanceolate, acuminate, plane to concave, finely asperous, 40 - 70 × 8 - 12 cm, glaucous-green, margins nearly straight; marginal teeth mostly curved, slender, bases slightly elevated, larger teeth 4 - 6 mm (middle of the lamina), dark brown, 1 - 3 cm apart; terminal **Sp** subulate, groove openly channelled to narrow, 3 - 4 cm, dark brown; **Inf** 3 - 4 m, 'paniculate', rather open, part-**Inf** rather small, 15 - 20 in the upper ½ of the **Inf**; **Fl** slender, 60 - 70 mm; **Ov** slender, cylindrical, 39 - 45 mm, neck grooved, long, slender, constricted; **Tep** yellow, tube funnel-shaped, 7 - 10 mm, lobes 18 - 21 mm.

A poorly known species.

A. lechuguilla Torrey (in Emory, Rep. US Mex. Bound. 213, 1858). **T**: USA, Texas (*Wright* 682 [US 125459]). - **D**: USA (S New Mexico, Texas), Mexico (Chihuahua, Coahuila, Nuevo León, Tamaulipas, Durango, Zacatecas, San Luis Potosí, Querétaro, Hidalgo, México, D.F.); Chihuahuan Desert, (500-) 950 - 2300 m. **I**: Gentry (1982: 126, 155). **Fig. IV.d**

Incl. *Agave univittata* var. *recurvispinis* hort. ex Besaucèle (s.a.); **incl.** *Agave univittata* var. *viridis* hort. ex Besaucèle (s.a.); **incl.** *Agave univittata* var. *zonata* hort. ex Besaucèle (s.a.); **incl.** *Agave univittata* var. *foliis striatis* hort. ex Besaucèle (s.a.) (*nom. inval.*, Art. 24.2); **incl.** *Agave caerulescens* Salm-Dyck (1859) ≡ *Agave lophantha* var. *caerulescens* (Salm-Dyck) Jacobi (1864) ≡ *Agave univittata* var. *caerulescens* (Salm-Dyck) H. Jacobsen (1973); **incl.** *Agave poselgeri* Salm-Dyck (1859) ≡ *Agave lophantha* var. *poselgeri* (Salm-Dyck) A. Berger (1915); **incl.** *Agave lophantha* var. *gracilior* Jacobi (1864) ≡ *Agave univittata* var. *gracilior* (Jacobi) H. Jacobsen (1973); **incl.** *Agave lophantha* var. *subcanescens* Jacobi (1864) ≡ *Agave univittata* var. *subcanescens* (Jacobi) H. Jacobsen (1973); **incl.** *Agave lophantha* var. *brevifolia* Jacobi (1867) ≡ *Agave univittata* var. *brevifolia* (Jacobi) H. Jacobsen (1973); **incl.** *Agave multilineata* Baker (1888); **incl.** *Agave lophantha* var. *angustifolia* A. Berger (1915) ≡ *Agave univittata* var. *angustifolia* (A. Berger) H. Jacobsen (1973); **incl.** *Agave lophantha* var. *pallida* A. Berger (1915); **incl.** *Agave lophantha* var. *tamaulipasana* A. Berger (1915) ≡ *Agave univittata* var. *tamaulipasana* (A. Berger) H. Jacobsen (1973).

[1g] **Ros** rather open, small, mostly 30 - 50 × 40 - 60 cm, freely suckering; **L** few, linear-lanceolate, mostly ascending to erect, sometimes falcately spreading, thick, stiff, deeply convex below, concave above, 25 - 50 × 2.5 - 4 cm, light green to yellow-green, sometimes marked with green, margins straight and continuous, light brown to grey, easily separable from dry **L**; marginal teeth typically deflected, weak and friable, regular in size, 2 - 5 mm, brown or mostly light grey, mostly 1.5 - 3 cm apart, 8 - 20 on each margin; terminal **Sp** conical to subu-

late, strong, 1.5 - 4 cm, greyish; **Inf** 2.5 - 3.5 m, 'spicate', scape generally glaucous, part-**Inf** mainly with 2 - 3 **Fl**, rarely ascending with longer stalks (2 - 15 cm) and several- to many-flowered; **Fl** 30 - 45 mm; **Ov** fusiform, 15 - 22 mm, neck constricted; **Tep** yellow or frequently tinged with red or purple, tube open, 2.5 - 4 mm, lobes subequal, 13 - 20 mm. – *Cytology*: $2n = 120$.

Usually easily recognizable by its widely suckering habit and narrow leaves with down-slanted teeth on straight margins. The taxon is a widespread characteristic component of varied Chihuahuan Desert communities and an important source of hard fibres (Gentry 1982: 154).

A. legrelliana Jacobi (Hamburg. Gart.- & Blumenzeit. 21: 567, 1865). – **D**: W Cuba. **I**: Berger (1915: 210).

Incl. *Agave americana* Sagra (1850) (*nom. illeg.*, Art. 53.1); **incl.** *Agave melanacantha* Lemaire ex Jacobi (1865); **incl.** *Agave laurentiana* Jacobi (1866); **incl.** *Agave coccinea* Lachaume (1876) (*nom. illeg.*, Art. 53.1); **incl.** *Agave legrelliana* var. *breviflora* Trelease (1913).

[21] **Ros** solitary; **L** variously lanceolate, subacuminate, concave, sometimes conduplicate, 100 - 200 × 20 - 30 cm, dark green, margins often concave; marginal teeth usually downcurved below, narrowly triangular, acuminate tapered, 2 - 6 mm, 1 - 1.5 (-2) cm apart, or from abrupt green prominences whose tops harden lunately; terminal **Sp** conically subulate, a little curved, openly or flatly grooved below the middle or involute, smooth, 1.5 - 2 cm, brown, dull, scarcely decurrent; **Inf** 6 - 8 m, 'paniculate', amply ovoid throughout, part-**Inf** on ascending-recurved **Br**, not known to be bulbiferous; **Ped** 20 - 30 mm; **Fl** (55-) 70 - 80 mm; **Ov** oblong, somewhat contracted at the base and at the top, ≤ 40 - 45 mm; **Tep** deep orange, tube ± 15 mm, lobes 30 mm; **Fr** rather narrowly oblong, stipitate and slightly beaked, 4 - 5 × 1.5 - 2 cm.

A. ×leopoldii Hort. ex G. Nicholson (Dict. Gard. Suppl., 82, 1900). – **Fig.** III.a, III.g

Garden hybrid *A. filifera* × *A. filifera* ssp. *schidigera* (Berger 1915: 76).

A. longibracteata (Verhoek-Williams) Thiede & Eggli (KuaS 50(5): 110, 1999). **T**: Mexico, Michoacán (Verhoek-Williams & al. 613 [US, BH, ME-XU]). – **D**: Mexico (Michoacán); among rocks, ± 2070 m. **I**: Verhoek-Williams (1978).

≡ *Manfreda longibracteata* Verhoek-Williams (1978).

[3a2] Plants large (for Subgen. *Manfreda*), reproducing vegetatively by stoloniferous rhizomes from the base of the parent rhizome, rhizome globose, to 5 cm Ø; **R** wiry; **L** up to 14, erect-spreading, linear-lanceolate to lanceolate, broadly channelled,

sometimes undulate, brittle, herbaceous, tip obtuse, with a very short point, 21 - 39 × 1.5 - 3.5 (-4.3) cm, bright green, rarely with magenta spots below on the basal 1/3, margins entire, slightly revolute; remains of **L** bases coarsely fibrous, to 6 cm; **Inf** to 1.25 m, 'spicate', flowering part open, with 15 - 21 **Fl**; floral **Bra** large, narrowly triangular; **Fl** sessile, spreading outwards from the axis, scent citronellalike; **Ov** oblong, protruding into the tube, 12 - 15 mm; **Tep** greenish-grey on the outer face, sometimes flushed with brown or darker green above, golden-green within, tube narrowly funnel-shaped, slightly curved, 15 - 20 mm, lobes oblong, upper lobes erect-spreading, lower lobes reflexed, 12 - 15 mm; **Fil** flattened; **Sty** exerted for 22 - 25 (-32) mm; **Fr** ellipsoid, 2 - 2.6 × 1 cm; **Se** 3 - 4 × 3 - 4.5 mm.

According to the protologue (Verhoek-Williams 1978) vegetatively most noticeable for its crisp bright green leaves with a broad round channel; in bud or flower recognizable by the long floral bracts. It appears to be closest to *A. scabra* (as *Manfreda brachystachya*).

A. longiflora (Rose) G. D. Rowley (Repert. Pl. Succ. 26: 4, 1977). **T**: USA, Texas (*Runyon* 10 [US, NY]). – **Lit**: Cházaro Basáñez & Machuca Núñez (1995). **D**: USA (Texas), Mexico (Tamaulipas); clay slopes, dry gravelly hills and prairies in sandy loam overlying caliche, flowers September. **I**: Addisonia 7: pl. 244, 1922, as *Runyonia*.

≡ *Runyonia longiflora* Rose (1922) ≡ *Manfreda longiflora* (Rose) Verhoek-Williams (1975); **incl.** *Runyonia tenuiflora* Rose in sched. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Runyonia tubiflora* Rose in sched. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Polianthes runyonii* Shinnars (1966).

[3a1] Plants medium-sized (for Subgen. *Manfreda*), rhizome to 6.5 × 2 cm; **R** fleshy; **L** 3 - 7 (-15), lanceolate, channelled, fleshy, tip acute, with a medium-sized point, to 26.5 × 1.4 (-2 in cultivation) cm, green with darker green or brown spots over the whole **L**, margins with coarse distantly-spaced cartilaginous (occasionally retrorse) teeth; membranous **L** bases covering the plant base, 2 - 5 cm; **Inf** to 50 (-96 in cultivation) cm, 'spicate', flowering part 8 - 20 (-35 in cultivation) cm, with 10 - 21 densely or laxly arranged **Fl**; **Fl** sessile, erect; **Ov** ellipsoid, 4 - 6 mm; **Tep** tube straight, narrowly funnel-shaped, 23 - 36 mm, lobes oblong, revolute, tip obtuse, with a small tuft of **Ha**, 8 - 14 (-19) mm; **St** very short, attached at the mouth of the tube; **Anth** 5 - 6 mm; **Sty** included; **Sti** 3-lobed, papillate; **Fr** depressed-globose, 0.9 - 1 × 1 - 1.3 cm; **Se** 3 × 4 mm.

This species is closely related to *A. maculosa*, from which it is distinguished by the longer narrow tepal tube, almost sessile anthers, and included styles, and smaller and more flattened fruits (Verhoek-Williams 1975: 224).

A. longipes Trelease (Mem. Nation. Acad. Sci. 11: 36, t. 63, 1913). **T**: Jamaica (Maxon 1624 [not indicated]). – **Lit**: Adams (1972). **D**: Jamaica (St. Andrews); local on well-drained slopes, 1000 - 1200 m.

[21] **L** as in the broader-leaved forms of *A. sobolifera*, curved; marginal teeth narrowly triangular, often appressed-recurved; terminal **Sp** sometimes much compressed and conical, more strongly and persistently flattened on the upper face and less involute, often grey; **Inf** 'paniculate', not known to be bulbilliferous; **Ped** 20 mm; **Fl** larger, 60 - 70 mm; **Ov** oblong-fusiform, 30 - 40 mm; **Tep** yellow, tube openly conical, 6 - 8 mm, lobes 20 - 25 mm; **Fil** 50 - 60 mm; **Fr** unknown.

Similar to *A. sobolifera*, but with larger flowers and longer filaments (Adams 1972).

A. lophantha Schiede (Linnaea 4: 582, 1829). – **D**: USA (Texas), Mexico (Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, Veracruz, Puebla); frequent on limestone, 30 - 1500 m. **I**: Gentry (1982: 126, 157, 160). **Fig. IV.e**

Incl. *Agave mezortillo* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave univittata* Haworth (1831); **incl.** *Agave heteracantha* Zuccarini (1832) $\equiv$ *Agave univittata* var. *heteracantha* (Zuccarini) Breitung (1959).

[1g] Stem sometimes visible on old **Ros**; **Ros** small, 0.3 - 0.6 $\times$ 0.5 - 1 m, solitary or surculose; **L** numerous, linear to lanceolate, radiating, patulous, rather thin, pliable, somewhat thickened towards the base and rounded below, plane to concave above, generally 30 - 70 $\times$ 3 - 5 cm, light green to yellow-green, with or without pale mid-stripe, margins horny, undulate to crenate; marginal teeth straight or mildly curved, slender, single or occasionally double, mostly 4 - 8 mm, 1 - 2 cm apart, on broad low prominences; terminal **Sp** subulate, flattened above at the base, small, 1 - 2 cm, ferruginous to grey; **Inf** slender, 'spicate', **Fl** in the upper $\frac{1}{2}$, part-**Inf** with 1 - 2 **Fl** or also with 3 - 7 **Fl** on short stalks; **Ped** 5 - 10 mm; **Fl** 35 - 47 mm; **Ov** fusiform, 18 - 22 mm, neck short or long (5 - 7 mm) and constricted; **Tep** light grey-glaucous-green to yellow, tube short, open, 2 - 4 mm, lobes subequal, 14 - 20 mm.

This species has often been misinterpreted. It is distinguished from the closely related *A. lechuguilla* by its flatter leaves with sinuous to undulate firm borders, tubercles usually with at least one double set of teeth (frequently more), and with teeth that are more slender and closely set (Gentry 1982: 159).

A. lurida Aiton (Hort. Kew. 1: 472, 1789). **T** [neo]: Ex cult. (*Masters* s.n. [K]). – **D**: Mexico (Oaxaca); semi-arid tropical forest, 1850 m. **I**: Gentry (1982: 276, 292-293).

Incl. *Agave vera-cruz* Miller (1768); **incl.** *Agave mexicana* Lamarck (1783); **incl.** *Agave verae-crucis*

Haworth (1812); **incl.** *Agave magni* Desfontaines (1815); **incl.** *Agave mangui* Desfontaines (1815) (*nom. inval.*, Art. 61.1?); **incl.** *Agave lepida* D. Dietrich (1840); **incl.** *Agave polyphylla* C. Koch (1860); **incl.** *Agave verna* A. Berger (1915); **incl.** *Agave breviscapa* A. Berger ex Roster (1916).

[2a] Stem short; **Ros** radially symmetrical, 1.2 - 1.7 $\times$ 2.4 - 3.4 m, solitary or only rarely surculose; **L** linear-lanceolate, stiffly ascending to outcurving, concave to guttered and thinning beyond the slightly narrowed base, 110 - 150 $\times$ 12 - 18 cm, dull green to glaucous-grey, margins nearly straight; marginal teeth very regular, larger teeth 4 - 6 mm, mostly 1 - 2 cm apart, smaller and closer together towards the **L** base, with low black bases, on low protuberances, cusps usually deltoid-flattened, straight or curved, brown to greyish; terminal **Sp** conically subulate, 3 - 4.5 cm, greyish-brown, decurrent for several cm; **Inf** 6 - 7 m, 'paniculate', part-**Inf** $\geq$ 20, ascending, diffusely spreading, several times compound, open, in the upper $\frac{1}{3}$ - $\frac{1}{2}$ of the **Inf**; **Fl** 58 - 65 mm; **Ov** 28 - 34 mm, neck constricted, grooved; **Tep** greenish-yellow, tube funnel-shaped, 9 - 11 mm, lobes about equal, 18 - 24 mm.

Long only known from cultivation in Europe and without close relatives. *A. vera-cruz* and *A. mexicana* would have priority over *A. lurida* if their identity with this species can be ascertained. *A. lurida* was frequently mentioned in the older literature, but its identity remains doubtful. It was rediscovered after $\pm$ 200 years by Gentry on one spot in Oaxaca (Gentry 1982: 293), but Ullrich (1991c) regards the neotypification of Gentry and the correlation of the re-collected material with the name *A. lurida* as doubtful.

A. macroacantha Zuccarini (Flora 15: 2(Beiblatt 2): 97, 1832). **T** [neo]: Mexico, Puebla (Gentry & al. 20242 [US]). – **D**: Mexico (Puebla [esp. around Tehuacán], Oaxaca). **I**: Gentry (1982: 578). **Fig. IV.f**

$\equiv$ *Agave flavescens* var. *macroacantha* (Zuccarini) Jacobi (1864); **incl.** *Agave pugioniformis* Zuccarini (1832); **incl.** *Agave flavescens* Salm-Dyck (1834); **incl.** *Agave macracantha* Herbert (1837) (*nom. inval.*, Art. 61.1?) $\equiv$ *Agave flavescens* var. *macracantha* (Herbert) Jacobi (1865); **incl.** *Agave bessereriana* Van Houtte (1868); **incl.** *Agave bessereriana* Jacobi (1869); **incl.** *Agave subfalcata* Jacobi (1869); **incl.** *Agave macrantha* Jacobi (1869) (*nom. inval.*, Art. 61.1?); **incl.** *Agave besseriana* [?] *candida* Jacobi (1870); **incl.** *Agave besseriana* [?] *longifolia* glauca Jacobi (1870) (*nom. inval.*, Art. 24.2); **incl.** *Agave besseriana* [?] *longifolia* viridis Jacobi (1870) (*nom. inval.*, Art. 24.2); **incl.** *Agave besseriana* [?] *hystrix* hort. ex Hooker (1871); **incl.** *Agave linearis* Jacobi (1871); **incl.** *Agave oligophylla* Baker (1877); **incl.** *Agave sudburyensis* Baker (1877); **incl.** *Agave paucifolia* Baker (1878)

(*nom. illeg.*, Art. 53.1); **incl.** *Agave integrifolia* Baker (1888); **incl.** *Agave macroacantha* var. *integrifolia* Trelease (1907); **incl.** *Agave macroacantha* var. *latifolia* Trelease (1907); **incl.** *Agave macroacantha* var. *planifolia* A. Berger (1915).

[2f] Stem short; **Ros** small, eventually 25 - 40 cm, commonly caespitose; **L** numerous, linear, rigid, radiately spreading, patulous, acuminate, 25 - 35 × 2.5 - 3 cm, bluish-grey-glaucous, margins straight or undulate; larger marginal teeth 3 - 4 mm, dark brown, irregularly spaced 1 - 3 cm apart, with slender cusps mostly curved from small low bases; terminal **Sp** subulate, straight to sinuous, rounded below, flat above, 3 - 3.5 cm, dark brown to grey, not decurrent; **Inf** ± 2 m, 'paniculate', slender, part-**Inf** shortly spreading, 10 - 14 in the upper ½ of the **Inf**, sometimes bulbiferous; **Fl** 50 - 56 mm; **Ov** angular-fusiform, 25 - 30 mm, neck constricted, deeply grooved; **Tep** pruinose green with purple tinge, tube 14 mm, lobes ± equal, 13 - 16 mm, quickly wilting at anthesis.

Trelease (1907) gives a detailed review of the complicated taxonomic history throughout European literature and lists many synonyms and misapplications of Zuccarini's name. His treatment is followed here.

A. maculosa Hooker (CBM 85: t. 5122 + text, 1859). **T:** [lecto - icono]: l.c. t. 5122. - **D:** USA (S Texas), Mexico (Nuevo León, Hidalgo, Puebla, San Luis Potosí, Tamaulipas, C Veracruz); dry chaparral, on slopes or between rocks, and in moist oak woods, 10 - 1830 m, flowers mainly March to June. **I:** CBM 85: t. 5122, 1859; Berger (1915: 30); Addisonia 18: t. 601, 1933/34.

≡ *Manfreda maculosa* (Hooker) Rose (1903) ≡ *Polianthes maculosa* (Hooker) Shinnars (1966); **incl.** *Agave maculata* Engelmann ex Torrey (1859) (*nom. illeg.*, Art. 53.1); **incl.** *Agave maculosa* var. *minor* Jacobi (1868); **incl.** *Agave maculosa* var. *brevituba* Engelmann (1875) ≡ *Agave maculata* var. *brevituba* (Engelmann) Mulford (1896) (*incorrect name*, Art. 11.4).

[3a1] Plants medium-sized; **L** erect-arching, linear-lanceolate, deeply channelled, 14 - 44 × 1.2 - 2.7 (-3.9 in cultivation) cm, dark green, unspotted or spotted with lighter green and brown or green, spots round to elliptic, sometimes glaucous, margins usually with small distantly spaced teeth; **Inf** 0.6 - 1.4 (-1.8 in cultivation) m, 'spicate', flowering part (7.5-) 14 - 22 (-29; to 48 in cultivation) cm, with 7 - 29 (-41) spreading **Fl**; **Ov** 9 - 16 (-19) mm; **Tep** tube 6 - 16 mm, lobes (6-) 9 - 13 (-16) mm, yellow-green or mahogany-brown inside; **Sty** longer than the lobes by up to 4 or shorter by up to 10 mm; **Fr** globose to oblong, 1.6 - 1.8 (-2.5) × 1.3 - 1.6 cm; **Se** 4 - 5 × 3 - 4 mm.

This species is, together with its putative nearest relative *A. longiflora*, unusual in the *Manfreda* Group by having a white to yellowish perianth that

darkens to rose, therewith closely approaching the *Polianthes* Group (Verhoek-Williams 1975: 217).

A. mapisaga Trelease (CUSNH 23: 130, 1920). **T:** Mexico, D.F. (Trelease 147 [MO]). - **D:** Mexico; cultivated only.

A. mapisaga var. *lisa* Gentry (Agaves Cont. North Amer., 604, ill., 1982). **T:** Ex cult. (Gentry 21980 [US, DES]). - **D:** Mexico; cultivated only.

[2b] Differs from var. *mapisaga*: **Ros** gigantic, 2 - 2.5 m tall, sparsely suckering; **L** larger, 200 - 275 × 25 - 30 cm; **Fl** 80 - 90 mm; **Ov** 47 - 55 mm, tube 14 mm, lobes unequal, outer 19 - 21 mm.

This appears to represent a clonal variety with unknown provenance. According to Gentry (1982: 604) it is the largest-growing *Agave*. Only *A. franzosinii* and *A. atrovirens* may reach similar or even larger sizes.

A. mapisaga var. *mapisaga* - **D:** Mexico (Tamaulipas, Zacatecas, Hidalgo, México, Oaxaca); cultivated only. **I:** Gentry (1982: 597, 603).

[2b] Stem short, massive; **Ros** openly spreading, large, 2 - 2.4 × nearly 4 - 4.8 m, surculose; **L** linear, spreading to ascending, sometimes re- or inflexed, base very thickly fleshy, long-acuminate, upwards guttered, 185 - 250 × 19 - 25 cm, green, pale glaucous, or zonate, margins straight to repand; marginal teeth small, brown, mostly 4 - 6 cm apart, cusps 2 - 5 mm from low bases; terminal **Sp** conical-subulate, narrowly grooved above, 3 - 5 cm, dark to greyish-brown, long decurrent; **Inf** massive, 7 - 8 m and more, 'paniculate', part-**Inf** widely spreading, heavy and densely several times compound, 20 - 25 per **Inf**; **Fl** 80 - 100 mm; **Ov** 40 - 52 mm, green, neck short, not constricted; **Tep** in bud frequently reddish, opening yellow, tube funnel-shaped, 14 - 21 mm, lobes unequal, 22 - 27 mm.

This is a cultivar distinguished from the related *A. salmiana* by its longer linear leaves without the sigmoid apical bend characteristic for the latter, but is less often cultivated than *A. salmiana* (Gentry 1982: 603).

A. margaritae Brandege (Proc. Calif. Acad. Sci., ser. 2, 2: 206, 1889). **T:** Mexico, Baja California (*Brandegee* s.n. [UC]). - **D:** Mexico (Baja California Sur: Santa Margarita and Magdalena Islands). **I:** KuaS 40(6): centre page pullout 1989/18.

Incl. *Agave connochaetodon* Trelease (1912).

[2h] **Ros** compact, small, caespitose; **L** 40 - 50, ovate to broadly lanceolate, thick, fleshy and rigid, narrowed above the base, shortly acuminate, concave above, 12 - 25 × 7 - 10 cm, glaucous-grey to yellowish-green, margins crenate; marginal teeth variously curved or flexed, weakly attached, 4 - 5 mm or to 8 - 15 mm (middle of the lamina), reddish-brown to greyish, 1 - 1.5 cm apart, on moderate

to prominent tubercles; terminal **Sp** subulate, 2 - 3 cm, shortly decurrent; **Inf** 2 - 3.5 m, 'paniculate', slender, part-**Inf** 6 - 12 in the upper 1/2 of the **Inf**; **Fl** 45 - 50 mm; **Ov** fusiform, 25 - 30 mm; **Tep** light yellow, tube $\pm$ 10 mm, lobes 15 mm.

Distinguished from all other taxa from Baja California esp. by its short broad leaves and the deep flower tube (Gentry 1982: 389).

A. marmorata Roezl (Belgique Hort. 33: 238, 1883). **T**: [neo - icono]: Curtis's Bot. Mag., 1912: t. 8442. - **D**: Mexico (Puebla [esp. around Tehuacán], Oaxaca). **I**: Gentry (1982: 508, 513-514); KuaS 43(3): centre page pullout 1992/10. **Fig. IV.a, IV.b**

Incl. *Agave todaroi* Baker (1888).

[2j] Stem short; **Ros** openly spreading, large, 1.2 - 1.3 $\times$ 2 m, solitary, rarely surculose; **L** 30 - 50, broadly lanceolate, frequently undulate, thick at the base, infolding along the middle of the lamina, involute at the spine base, convex below, flat above, generally roughly scabrous, mature **L** 100 - 135 $\times$ 20 - 30 cm, glaucous-grey to light green, sometimes zonate, margins crenate, with fleshy prominences; marginal teeth flattened, mostly 6 - 12 mm, chestnut-brown to dark brown, 2 - 5 cm apart, cusps from very broad bases, mostly straight, intermittent teeth few or none; terminal **Sp** usually shortly conical, 1.5 - 3 cm, rarely shortly decurrent; **Inf** 5 - 6.5 m, 'paniculate', part-**Inf** large, diffusely several times compound, 20 - 25 in the upper 1/2 of the **Inf**; **Fl** small, 40 - 48 mm; **Ov** cylindrical, 20 - 25 mm, light green, neck not constricted, scarcely grooved; **Tep** brilliant yellow, tube shallowly funnel-shaped, 5 - 6 mm, lobes equal, 14 - 16 mm.

Distinguished by the shortly conical terminal spines, the coarsely rough greyish leaves with strong prominences, and the small golden-yellow flowers in large diffuse 'panicles' (Gentry 1982: 512).

A. maximiliana Baker (Gard. Chron., ser. nov. 1877: 201, 1877). **T** [neo]: Ex cult. (*Anonymus* s.n. [K]). - **Lit**: McVaugh (1989). **D**: Mexico (Sinaloa, Durango, Zacatecas, Nayarit, Jalisco, Colima); dry rocky mountain slopes in the oak- and pine-forest zone, 930 - 2000 (-2700) m. **I**: Gentry (1982: 325, 348-349, 351).

Incl. *Agave gustaviana* hort. ex Baker (1877); **incl.** *Agave crenata* A. Berger (1911) (*nom. illeg.*, Art. 53.1); **incl.** *Agave conjuncta* A. Berger (1915); **incl.** *Agave katharinae* A. Berger (1915) $\equiv$ *Agave maximiliana* var. *katharinae* (A. Berger) Gentry (1982).

[2d] **Ros** acaulescent or short-stemmed, of medium size, solitary; **L** usually broadly (ob-) lanceolate, curved, straight or slightly recurved, softly fleshy, generally 40 - 80 $\times$ 10 - 20 cm, mostly pale glaucous pruinose over yellow-green to green, or bluish-glaucous, margins variously repand to undu-

late or crenate, with strong prominences; marginal teeth heteromorphic, larger teeth variously curved, compressed, 6 - 10 mm (middle of the lamina), 1.5 - 3 cm apart, cusps slender, from elongate low (sometimes confluent) bases, intermittent teeth numerous, variable; terminal **Sp** slenderly conical, straight, smooth, 2.5 - 4 cm, brown or chestnut-brown to grey, shortly decurrent at the base; **Inf** 5 - 8 m, 'paniculate', narrow, part-**Inf** small, rather rounded, 15 - 25 (-30) in the upper 1/2 of the **Inf**; **Fl** slender, 52 - 65 mm; **Ov** 28 - 35 mm, neck short or long; **Tep** greenish-yellow, frequently flushed with rufous, tube openly funnel-shaped, 5 - 9 (-12) mm, lobes subequal, 15 - 22 mm; **Fr** shortly oblong, stipitate, tip rounded, 3.5 - 5 $\times$ 1.7 - 2 cm; **Se** with wavy testa, finely punctate, marginal wing abruptly raised, 5.5 - 6 $\times$ 4.5 - 5 mm.

Var. *katharinae* is included in the synonymy of the species according to McVaugh (l.c.).

A. mckelveyana Gentry (CSJA 42: 225-228, ill., 1970). **T**: USA, Arizona (Gentry 21979 [US]). - **Lit**: Turner & al. (1995). **D**: USA (W-C Arizona); rocky slopes in Chaparral and juniper associations, 8500 - 2200 m. **I**: Gentry (1982: 356). **Fig. IV.g**

[2h] **Ros** small, 20 - 40 cm, solitary or suckering; **L** rather few, linear or lanceolate, firmly spreading, broadest in the middle, 20 - 35 $\times$ 3 - 5 cm, light glaucous green or yellowish-green, margins nearly straight or undulate; marginal teeth curved downwards, rather friable, small to medium-sized, larger teeth in the middle of the lamina, 4 - 8 mm, greyish with reddish tips, mostly 1 - 3 cm apart, tubercles low; terminal **Sp** subulate, 1.5 - 4 cm, chestnut-brown to grey, shortly decurrent; **Inf** 2 - 3 m, 'paniculate', narrow, part-**Inf** small, compact, 10 - 19 in the upper 1/2 of the **Inf**; **Fl** small, 30 - 40 mm; **Ov** 16 - 22 mm incl. the constricted neck, light green; **Tep** openly spreading, yellow, tube open, 3 - 4.5 mm, lobes unequal, 12 - 23 mm.

Ecologically separated from its close relative *A. deserti* ssp. *simplex*, which is confined to lower elevations (Gentry 1982: 390). It hybridizes with *A. deserti* ssp. *simplex* and *A. utahensis* ssp. *utahensis* (Hodgson 1999).

A. michoacana (Cedano & al.) Thiede & Egli (KuaS 50(5): 112, 1999). **T**: Mexico, Michoacán (*Escobedo* 1485 [IEB]). - **D**: Mexico (Michoacán); wet meadows, 2200 - 2700 m, flowers July to September. **I**: Cedano M. & al. (1993).

$\equiv$ *Polianthes michoacana* Cedano & al. (1993).

[3b1] Plants erect, scapose; **R** unknown; **L** 4 - 10, linear, long attenuate, 27.7 - 63.6 $\times$ 0.35 - 1 cm, margins and keel papillose, scape **L** triangular-linear, tip attenuate, all **L** yellowish-green, glabrous, basal **L** from an ovoid white bulb 2 $\times$ 1 - 2 cm, covered with the remains of **L** bases apically desintegrating into fibres; **Inf** 0.4 - 1.2 m, with up to 3 groups of sessile paired **Fl**; **Ov** cylindrical, 8.5 - 10

mm; **Tep** white, tube basally erect, upper part gradually flaring, 80 - 100 × 3 - 5 (middle of the tube) mm, lobes triangular, attenuate, 10 - 15 × 5 - 6 mm; **Anth** 6 - 11 mm; **Sty** columnar, slightly triangular; **Sti** lobes oblong, tip obtuse, reflexed, 1.5 - 2 mm; **Fr** ellipsoid, 2.3 - 2.5 × 1.4 - 1.5 cm; **Se** flattened, obovate-clavate, asymmetrical, 4.2 mm.

According to the protologue closely related to *A. dolichantha* (as *Polianthes longiflora*) (Cedano M. & al. 1993).

A. millspaughii Trelease (Mem. Nation. Acad. Sci. 11: 41, t. 87-88, 1913). **T**: Bahamas, Great Exuma (Britton & Millspaugh 3091 [NY]). – **D**: Bahamas; low coppices and scrublands.

[2n] Acaulescent; **Ros** solitary; **L** narrowly oblanceolate, concave, to 125 × 15 cm, green, somewhat glossy, margins between the teeth nearly straight; marginal teeth straight and spreading or occasionally reflexed, sometimes with upcurved tips, narrowly triangular, 3 - 5 mm, brown to nearly black, mostly 15 - 25 mm apart, scarcely lenticular at the base; terminal **Sp** triquetrous, conical, straight, round-grooved to about the middle or occasionally involute, smooth, rather dull, 1.5 - 2 cm, red-brown, decurrent; **Inf** to ± 10 m, 'paniculate', oblong, part-**Inf** with subascending **Br**, in the upper ⅓ of the **Inf**; **Ped** ± 10 mm; **Fl** ± 50 mm; **Ov** fusiform, 25 mm; **Tep** 15 - 20 × 4 mm, yellow, tube conical, ± 7 mm; **Fr** shortly oblong, shortly stipitate and beaked, 20 - 35 mm.

A. missionum Trelease (Mem. Nation. Acad. Sci. 11: 37-38, t. 72-75, 1913). **T**: St. Thomas (Trelease 15 [not indicated]). – **D**: Puerto Rico, Virgin Islands, St. Thomas. **I**: Succulenta 65: 162-163, 1986.

Incl. *Agave vivipara* Oldendorp (1777) (*nom. illeg.*, Art. 53.1); **incl.** *Agave morrisii* Eggers (1889) (*nom. illeg.*, Art. 53.1); **incl.** *Agave eggersiana* Trelease (1913).

[2l] **Ros** solitary; **L** broadly lanceolate, gradually acute, concave, occasionally conduplicate, 250 - 275 × 20 cm, dark green or very slightly greyish, rather glossy, margins nearly straight; marginal teeth straight, gently curved, or bent in either direction, conspicuously triangular, 3 - 5 mm, brown to nearly black, mostly 1 - 1.5 cm apart, smaller teeth from often confluent lenticular bases; terminal **Sp** somewhat triquetrously subulate, straight or a little upcurved, round-grooved to about the middle or occasionally involute, smooth, 1.5 - 2.5 cm, brown, or grey in age, somewhat glossy, decurrent; **Inf** 5 - 7 m, 'paniculate', oblong, part-**Inf** on somewhat ascending **Br**, in the upper ⅓ of the **Inf**; **Fl** 55 mm; **Ov** oblong-fusiform, 30 mm; **Tep** yellow, tube ± 7 mm, lobes 15 - 20 mm; **Fr** broadly oblong or somewhat turbinate, stipitate and beaked, 3 - 4 × 2 - 2.5 cm.

A. mitis Martius (Del. Sem. Hort. Bot. Monac. 1848: [], 1848). **T** [neo]: Mexico, Tamaulipas (Gentry 20077 [MEXU, DES, US]). – **D**: Mexico (Tamaulipas, San Luis Potosí, Hidalgo).

A. mitis var. **albidior** (Salm-Dyck) Ullrich (Succulentes 16(1): 32, 1993). **T** [neo]: Ex cult. (*Anonymus* Kew no. 109 [K]). – **D**: Mexico (Hidalgo); only known from the type locality. **I**: Gentry (1982: 217, 224, as *A. celsii* var. *albicans*).

≡ *Agave micrantha* var. *albidior* Salm-Dyck (1859); **incl.** *Agave albicans* Jacobi (1865) ≡ *Agave micrantha* var. *albicans* (Jacobi) A. Terracciano (1885) ≡ *Agave celsii* var. *albicans* (Jacobi) Gentry (1982); **incl.** *Agave ousselghemiana* Jacobi (1868); **incl.** *Agave concinna* Hort. Angl. ex Baker (1877) (*nom. illeg.*, Art. 53.1).

[1f] Differs from var. *mitis*: **L** pale glaucous; **Tep** lobes larger, 20 - 27 mm.

In cultivation since ± 1850. A small colony in the Barranca de Metztlán appears assignable to this variety (Gentry 1982: 223-224).

A. mitis var. **mitis** – **D**: Mexico (Tamaulipas, San Luis Potosí, Hidalgo). **I**: Gentry (1982: 217, 221, as *A. celsii*). **Fig. V.c**

Incl. *Agave celsii* var. *celsii*; **incl.** *Agave micrantha* Salm-Dyck (1855); **incl.** *Agave celsii* Hooker (1856) ≡ *Agave bollii* var. *celsii* (Hooker) A. Terracciano (s.a.) (*incorrect name*, Art. 11.1); **incl.** *Agave rupicola* Regel (1858); **incl.** *Agave micracantha* Salm-Dyck (1859); **incl.** *Agave densiflora* Regel (1863); **incl.** *Agave bouchei* Jacobi (1865) ≡ *Agave rupicola* var. *bouchei* (Jacobi) A. Terracciano (1885); **incl.** *Agave celsiana* Jacobi (1865); **incl.** *Agave haseloffii* Jacobi (1866); **incl.** *Agave oblongata* Jacobi (1868); **incl.** *Agave botteri* Hemsley (1876).

[1f] **Ros** branching axillary, forming large long-lived dense clumps; **L** ovate, oblong, or spatulate, ascending to outcurving, thickly soft-fleshy, short-acuminate, convex below, guttered or concave above, 30 - 60 (-70) × 7 - 13 cm, green to light grey-glaucous, margins straight to undulate; marginal teeth sometimes with ciliate crests, small, 1 - 3 mm, whitish to reddish-brown, closely spaced; terminal **Sp** acicular, weak, 1 - 2 cm, brownish, decurrent along the **L** tip for 1 - 6 cm and more; **Inf** 1.5 - 2.5 m, 'spicate', densely bracteate and flowered, becoming lax at fruiting time, part-**Inf** with geminate **Fl**; **Fl** fleshy, 40 - 60 mm; **Ov** 13 - 20 mm, without neck; **Tep** green outside, yellow to reddish or lavender to purplish within, tube funnel-shaped, 10 - 17 mm, lobes dimorphic, 12 - 18 mm. – *Cytology*: 2n = 60.

Distinguished by its small compact rosettes, broad delicately denticulate leaves, and densely clavate inflorescences (Gentry 1982: 222). Gentry wrongly named this taxon *A. celsii*, and the nomenclature was finally clarified by Ullrich (1993a).

A. montana Villarreal (Sida 17(1): 191-195, ill., 1996). **T:** Mexico, Nuevo León (Villarreal & al. 8120 [MEXU, ANSM, ENCB]). – **D:** Mexico (Nuevo León); limestone slopes, 3200 - 3400 m, only known from the type locality.

[2b] **Ros** semiglobose, compact, $0.9 - 1.35 \times 1.4 - 1.65$ m, solitary; **L** 84 - 112, regular in 12 - 16 rows, shortly elliptic, base broadened, apex acuminate, slightly concave to nearly flat, $30 - 40 \times 15 - 17$ cm, yellowish-green, margins straight, near the tip bordered brown-purple; marginal teeth antrorse and retrorse, greyish, 2.5 - 3.5 cm apart, 16 - 18 per margin; terminal **Sp** 3 - 5 cm; **Inf** 3.5 - 4.5 m, 'paniculate', ovate, with dentate **Bra**, part-**Inf** 20 - 30 in the upper $\frac{2}{3}$ of the **Inf**; **Ped** 1 - 1.5 cm; **Fl** 60 - 70 mm; **Ov** 30 mm; **Tep** yellow, tube 20 mm, lobes 20 mm.

According to the protologue related to *A. parryana* of Group *Parryanae* and esp. to *A. gentryi* (= *A. macroculmis* sensu Gentry) where it was formerly erroneously included despite being clearly distinct in many features. The descriptions of both Gentry (1982) and Ullrich (1990i) for the last-mentioned taxon combine characters of both species.

A. moranii Gentry (Occas. Pap. Calif. Acad. Sci. 130: 58, ill. (pp. 59-61), 1978). **T:** Mexico, Baja California (Gentry & McGill 23287 [US, DES, SD]). – **Lit:** Turner & al. (1995). **D:** Mexico (Baja California: S San Pedro Mártir); small desertic area, 450 - 1850 m. **I:** Gentry (1982: 356, 393).

[2h] Stem short; **Ros** large, $1 - 1.5 \times 2$ m, solitary; **L** triangularly long-lanceolate, straightly ascending to spreading, rigid, rounded beneath, deeply guttered, $70 - 120 \times 8 - 12$ cm, light to yellowish-green, sometimes glaucous, margins towards the **L** tip white-horny; marginal teeth sinuously curved, flattened, 6 - 12 mm (middle of the lamina and below), light grey, 2 - 4 cm apart, base broad or continuous with the **L** margin, teeth reduced and more remote towards the **L** tip; terminal **Sp** stout, broadly grooved above, 4 - 6 cm, nearly white, tip chestnut-brown, decurrent to the middle of the lamina; **Inf** 4 - 5 m, 'paniculate', part-**Inf** closely spaced, compact, large, 20 - 30 per **Inf**; **Ped** slender, 1 - 3 cm; **Fl** 50 - 70 mm; **Ov** fusiform, 25 - 40 mm, neck short, grooved, thick; **Tep** bright yellow, tube broadly funnel-shaped, 4 - 6 mm.

Distinguished from all other taxa in Group *Deserticolae* by its large solitary rosettes with large long rigid leaves with an apical horny margin, stout scapes and relatively congested panicles. It appears to be close to *A. avellanidens* and *A. gigantensis* (Gentry 1982).

A. murpheyi F. Gibson (Contr. Boyce Thompson Inst. Pl. Res. 7: 83, fig. 1, 1935). **T:** USA, Arizona (Gibson s.n. [Herb. Boyce Thompson Arboretum]). – **D:** USA (Arizona), Mexico (Sonora); "arborescent desert" within the Sonoran Desert, moun-

tainous slopes or bajadas, 460 - 930 m. **I:** Gentry (1982: 421, 442-443).

[2g] **Ros** compact, $0.6 - 0.8 \times \pm 1$ m, freely suckering; **L** linear, firm, straight, short-acuminate, $50 - 65 \times 6 - 8$ cm, light glaucous-green to yellowish-green, frequently lightly cross-zoned, with clearly visible impressions left by the central bud, margins undulate; marginal teeth regular, small, 3 - 4 mm, bases brown, cusps becoming grey, 1 - 2 cm apart; terminal **Sp** conical, very shortly grooved or flattened above, short, 1.2 - 2 cm, dark brown becoming greyish; **Inf** 3 - 4 m, 'paniculate', short, compact, part-**Inf** compact, short, 10 - 15 in the upper $\frac{1}{4}$ or $\frac{1}{3}$ of the **Inf**, richly bulbilliferous, rarely producing **Fr**; **Fl** 65 - 75 mm; **Ov** thick, rounded, 32 - 40 mm, neck scarcely narrowed; **Tep** pale waxy green, tips purplish to brownish, tube deep, urceolate, 16 - 20 mm, lobes unequal, outer 15 - 19 mm. – *Cytology*: $2n = 60$.

The species appears to be at least partially associated with old living sites of native Americans (Gentry 1982: 443), which is also true for *A. delamateri* and *A. decipiens*. It hybridizes with *A. chrysantha* (Hodgson 1999).

A. nanchititlensis (Matuda) Thiede & Eggli (KuaS 50(5): 110, 1999). **T:** Mexico, México (Matuda 37640 [MEXU]). – **D:** Mexico (México); rocky sloping oak or oak-pine woods, flowers in January. **I:** Ullrich (1989).

≡ *Manfreda nanchititlensis* Matuda (1974).

[3a2] Plants small (for Subgen. *Manfreda*), daughter **Ros** arising in the **Ax** of the current year's **Ros**; **R** numerous, half-fleshy, spreading horizontally from the rhizome base; rhizome slender, 1.5 - 2 cm; **L** 4 - 9, upright-arching, linear, roundly channelled, tough-fibrous, $21 - 39 \times 0.4 - 0.8$ (-1) cm, densely spotted on both faces with irregular brown or dark green spots, veins on both faces with single rows of papillae, margins with a thin maroon line, entire or minutely papillate like the veins; remains of the **L** bases fibrous, 5.5 - 7 cm; **Inf** 35 - 94 cm, 'spicate', flowering part very open, 11 - 20 cm, with 7 - 10 flowering nodes; **Fl** sessile, horizontal when mature; **Ov** long-ellipsoid, 11 - 17 mm; **Tep** green with purple flush on the upper part, tube cylindrical, narrow, straight or slightly arched, $25 - 30 \times 3$ (middle of the tube) mm, lobes revolute, 6 - 10 mm, yellowish-green on both faces; **Sty** exserted, 45 - 56 mm; **Sti** clavate, deeply furrowed, broadly expanded at maturity; **Fr** ellipsoid, $1.5 - 1.9 \times 1.1 - 1.2$ cm; **Se** lunate, 3 mm.

This is the most slender species in the subgenus *Manfreda* and is therefore easily recognized by its nearly grass-like leaves, its lax inflorescence, and its long narrow floral tube (Verhoek-Williams 1975: 289).

A. nashii Trelease (Mem. Nation. Acad. Sci. 11: 45-46, t. 101-103, 1913). **T** [syn]: Bahamas, Inagua

(Nash & Taylor s.n. [NY, MO?]). – **Lit:** Correll & Correll (1982). **D:** Bahamas (Inagua); dwarf scrub and scrublands on sandy-rocky soils.

[2p] **Ros** solitary; **L** attenuate-oblong, concave, 30 - 50 × 4 - 5 cm, grey-green, sometimes purple-tinged, somewhat glaucous and with transverse bands, margins between the teeth nearly straight; marginal teeth straight or somewhat curved, acuminate, triangular, sometimes nearly or quite confluent, scarcely 2 mm long, usually 3 - 5 mm apart; terminal **Sp** smooth, somewhat polished and recurved or upcurved towards the end, conically tapering, narrowly slit-grooved to beyond the middle, 0.3 - 1.5 cm, purplish-brown, decurrent; **Inf** 3.5 - 4 m, 'paniculate', part-**Inf** very lax, on slender out-curved **Br**, in the upper ½ of the **Inf** or more; **Ped** 5 - 10 mm; **Fl** ± 35 mm; **Ov** subfusiform to ovoid, 20 mm; **Tep** ± 13 × 3 mm, light yellow, tube openly conical, 3 mm; **Fr** oblong to oblong pear-shaped, slightly stipitate and beaked, 2 - 2.5 × 2 cm.

A. nayaritensis Gentry (Agaves Cont. North Amer., 515-516, ill., 1982). **T:** Mexico, Nayarit (Gentry 21167 [US, DES, MEXU]). – **D:** Mexico (Nayarit); volcanic cliff edges, 600 - 700 m, known only from the type locality.

[2j] **Ros** open, medium-sized, solitary, rarely surculose; **L** few, lanceolate, rather floppy, etiolated when growing in shady conditions (in habitat), narrowed towards the base, widest above the middle, long-acuminate, somewhat asperulous, 85 - 115 × 12 - 15 cm, light green, margins undulate to straight; marginal teeth small, 1 - 3 mm, chestnut-brown or darker, regularly spaced 1 - 1.5 cm apart, with scattered minute intermittent teeth; terminal **Sp** conical, with short narrow groove above, 0.9 - 1.5 cm, dark brown, not decurrent; **Inf** 3 - 4 m, 'paniculate', diffuse, ovate in outline, scape short, part-**Inf** widely spreading, several times compound, 14 - 15 in the upper ½ of the **Inf**; **Fl** small, 40 - 45 mm; **Ov** rounded-trigonous, 20 - 25 mm, neck short, furrowed; **Tep** bright yellow, tube broadly funnel-shaped, 4 mm, lobes subequal, 15 - 17 mm.

Without close relationship to other members of Group *Marmoratae* (Gentry 1982: 516).

A. neglecta Small (Fl. Southeast. US, 289, 1903). **T** [lecto]: USA, Florida (Weber s.n. [MO, NY]). – **D:** USA (Florida); sandy beaches. **I:** Gentry (1982: 627).

[2a] Stem short, 30 - 40 cm; **Ros** large, 1.3 - 1.7 m, suckering freely; **L** broadly lanceolate, ascending or arching, or reflexed in age, thickened and narrowed towards the base, acuminate, concave, 100 - 150 × 15 - 25 cm, pale green, glaucous, margins nearly straight; marginal teeth fine, small, closely set below, margin becoming toothless above; terminal **Sp** acicular, 2.5 cm, scarcely decurrent; **Inf** very tall, to 8 - 10 m, 'paniculate', open, broad, part-**Inf** diffusely compound, 18 - 20 in the upper ½

- ½ of the **Inf**, bulbiferous; **Fl** 55 mm; **Tep** greenish-yellow, lobes ± 23 mm.

A hardly known species apparently close to *A. weberi* and *A. desmetiana* (Gentry 1982: 628). It is most probably of cultivated origin. Ullrich (1990d: 106) places it in Group *Agave*, which contrasts Gentry's placement in Group *Viviparae* (as *Sisalanæ*).

A. neomexicana Wooton & Standley (CUSNH 16(4): 115, pl. 48, 1913). **T:** USA, New Mexico (Standley 541 [US 498333]). – **D:** USA (S New Mexico, SW Texas), Mexico (Coahuila?). **I:** Gentry (1982: 522, 537). **Fig. V.d**

≡ *Agave parryi* var. *neomexicana* (Wooton & Standley) McKechnie (1949) ≡ *Agave parryi* ssp. *neomexicana* (Wooton & Standley) B. Ullrich (1992).

[2i] **Ros** rather flat-topped, small to medium-sized, freely suckering; **L** few to many, lanceolate, rigid, usually broadest near the middle, mostly rather shortly acuminate, thickly rounded below, concave above, 20 - 45 × 5 - 12 cm; marginal teeth nearly straight or curved, slender, mostly 5 - 7 mm (above the middle of the lamina), dark brown to greyish, 1 - 3 cm apart; terminal **Sp** subulate to acicular, upper face flat, with a broad shallow groove, 2.5 - 4 cm, decurrent for 1 to several teeth; **Inf** 3 - 4 m, 'paniculate', part-**Inf** compact, mostly 10 - 17 in the upper ½ of the **Inf**; **Fl** 55 - 67 mm; **Ov** slender, fusiform, 32 - 38 mm, neck furrowed, constricted, 4 - 7 mm; **Tep** red to orange in bud, opening yellow, **OTep** reddish-tipped, tube funnel-shaped, 12 - 14 mm, lobes nearly equal, 15 - 20 mm. – *Cytology*: 2n = 120.

Distinguished from its closest relative *A. parryi* by generally having the rosettes in smaller groups, more slender leaves, and smaller inflorescences with fewer part-inflorescences (Gentry 1982: 537). The occurrence in Coahuila is based on a single doubtful specimen only and needs verification.

A. neonelsonii Thiede & Eggli (KuaS 50(5): 112, 1999). **T:** Mexico, Durango (Nelson 4630 [US?]). – **D:** Mexico (Durango).

Incl. *Polianthes nelsonii* Rose (1903).

[3b1] **L** several, linear, margins serrulate, from an oblong bulb, bulb tunics (= remains of dead **L**) thin, scape **L** much reduced; **Inf** erect, 'spicate', glabrous, ± 40 cm, with 2 - 5 paired sessile **Fl**; **Ov** 9 - 16 (-19) mm; **Tep** tube strongly curved downwards near the middle, very slender below, ± 50 mm, white, lobes short, tip rounded; **Fil** 3 mm (free part), attached near the mouth of the tube; **Anth** 2 mm; **Sti** exserted.

An insufficiently known species and apparently recorded from 2 collections only. The new name for *Polianthes nelsonii* was necessary to avoid homonymy with *A. nelsonii* Trelease 1912.

A. neopringlei Thiede & Eggli (KuaS 50(5): 112,

1999). **T:** Mexico, Jalisco (*Pringle* 5438 [GH, US]). – **Lit:** McVaugh (1989). **D:** Mexico (Durango, Nayarit, Aguascalientes, Guanajuato?, Jalisco, Guerrero, Morelos, San Luis Potosí); grasslands, grassy opening and hillsides in pine-oak forest regions, wet meadows and pastures, 800 - 2200 m, flowers August to October. **I:** Rose (1903: fig. 2, as *Polianthes durangensis*).

Incl. *Polianthes pringlei* Rose (1903); **incl.** *Polianthes durangensis* Rose (1903).

[3b1] Plants glabrous, subcaulescent; stem often 5 - 6 cm, from a narrowly ovoid bulb; **R** fleshy; **L** (1-) 5 - 10 in a basal **Ros** (or 1 - 6 additional **L** a few cm above the base of the scape), erect or nearly so, linear-attenuate, 10 - 25 (-45) × (0.1-) 0.3 - 0.7 (-1) cm, margins ± papillose, sometimes also papillose on the veins of the lower face; **Inf** 25 - 45 (-65) cm, 'spicate', flowering part 8 - 12 (-20) cm, with 3 - 7 widely spaced flowering nodes with paired **Fl**; **Fl** sessile, fragrant; **Ov** erect; **Tep** white, sometimes pale pink, or white inside and pink outside, tube ascending from the base, commonly smoothly curved outwards ± in the middle or below, slenderly cylindrical below, narrowly funnel-shaped above, 30 - 70 mm, 2.5 - 4 mm (distally) Ø, lobes subequal in 2 series, ascending-spreading or finally recurved, elliptic to oblong or oblanceolate, (5-) 10 - 15 mm; **St** included; **Sty** included, with 3 elliptic-oblong or ovate lobes ± 1.5 mm; **Fr** broadly ellipsoid, 1 - 1.3 × 0.8 - 1 cm; **Se** 3.5 - 4 mm.

The new name for *Polianthes pringlei* was necessary to avoid homonymy with *A. pringlei* Engelm. ex Orcutt 1883. The name of the heterotypic synonym *P. durangensis* could not be used because of *A. durangensis* Gentry.

A. nizandensis Cutak (CSJA 23(5): 143-145, ills., 1951). **T:** Mexico, Oaxaca (*Cutak* 19 [MO]). – **Lit:** Ullrich (1991j: with ills.). **D:** Mexico (Oaxaca). **Fig. V.e**

[1b] **Ros** open, small, surculose; **L** few, linear-lanceolate, patulous, sparsely fibrous, rather brittle or pliable, ± straight, convex below, plane above, 20 - 30 × 1.5 - 2.5 cm, green with pale midstripe, margins finely serrulate; terminal **Sp** conical, not pungent, small, 4 - 8 mm; **Inf** 1 - 2 m, 'spicate', sparsely flowered in the upper ¼, part-**Inf** with 2 - 4 **Fl**; **Ped** geminate, 6 - 10 mm; **Fl** 35 - 40 mm; **Ov** cylindrical, 12 - 15 mm, neck short, not constricted; **Tep** pale yellow; tube shortly funnel-shaped, 3 - 4 mm, lobes 15 - 16 mm.

A very distinct species without close relatives. It does not fit well into any section or group (Gentry 1982: 75). This prompted Ullrich (1991j) to erect a section (Sect. *Nizandensae*) of its own for the species, which is not followed here.

A. obscura Schiede (Linnaea 5: 464, 1830). **T** [neo]: Mexico, Veracruz (Gentry & al. 20417 [US, DES, MEXU]). – **Lit:** Cházaro Basañez (1981);

Ullrich (1990j: with ills.). **D:** Mexico (Tamaulipas, San Luis Potosí, Veracruz, Puebla, Oaxaca). **I:** Gentry (1982: 217, 229, 231).

Incl. *Agave myriacantha* hort. ex Besaucèle (s.a.); **incl.** *Agave densiflora* var. *angustifolia* hort. ex Besaucèle (s.a.) (*nom. illeg.*, Art. 53.1); **incl.** *Agave hookeri* hort. ex Besaucèle (s.a.) (*nom. illeg.*, Art. 53.1); **incl.** *Agave micracantha* Baker (s.a.) (*nom. illeg.*, Art. 53.1); **incl.** *Agave densiflora* var. *foliis striatis aureis* hort. ex Besaucèle (s.a.) (*nom. inval.*, Art. 24.2); **incl.** *Agave densiflora* Hooker (1857) ≡ *Agave polyacantha* var. *densiflora* (Hooker) A. Terracciano (1885); **incl.** *Agave chloracantha* Salm-Dyck (1859); **incl.** *Agave uncinata* Jacobi (1865); **incl.** *Agave xalapensis* Roezl ex Jacobi (1865) ≡ *Agave polyacantha* var. *xalapensis* (Roezl ex Jacobi) Gentry (1982); **incl.** *Agave polyacantha* Jacobi (1865) (*nom. illeg.*, Art. 53.1); **incl.** *Agave lamprochlora* Jacobi (1868); **incl.** *Agave muilmanii* Jacobi (1870); **incl.** *Agave caribaea* Verschaffelt (1873); **incl.** *Agave attenuata* var. *subdenudata* hort. ex Trelease (1892); **incl.** *Agave engelmannii* Trelease (1892); **incl.** *Agave flaccifolia* A. Berger (1915).

[1f] **Ros** openly spreading, medium-sized, solitary or caespitose; **L** lanceolate-acuminate to oblong and short-acuminate, straightly ascending to upcurving, tissue firm, finely fibrous, lamina narrowed above the base, broadest in the middle, usually plane, 35 - 65 × 7 - 10 cm, green or yellow-green, passing into glaucous, margins generally straight, not horny except for the thinly decurrent terminal **Sp**; marginal teeth deltoid, 2 - 6 mm, reddish to dark brown, closely spaced or up to 5 - 12 mm apart; terminal **Sp** acicular, rounded below and above, small, 0.5 - 2.5 (-3.5) cm, dark brown; **Inf** 2 - 3 m, 'spicate', laxly or densely flowered in the upper ½ - ¾, rarely bulbiferous, part-**Inf** mostly with geminate **Fl**; **Ped** short, stout, 2 - 3 mm; **Fl** 46 - 51 mm; **Ov** cylindrical, 17 - 20 mm, green, neck short, not constricted; **Tep** reddish, tube funnel-shaped, 7 - 9 mm, lobes unequal, 19 - 23 mm. – *Cytology*: 2n = 60.

Recognized by its slender flowers with the rounded, ungrooved ovary, and well-developed teeth on the elongate-lanceolate leaves (Gentry 1982: 229, as *A. polyacantha*). Gentry misapplied the name *A. polyacantha* Haworth to these plants, but this name is of uncertain status. Ullrich (l.c.) consequently re-established the oldest available name, *A. obscura* Schiede. This name was in turn misapplied by both Trelease and Gentry to a taxon recently described by Ullrich (l.c.) as *A. horrida* ssp. *perotensis* (see there).

A. ocahui Gentry (US Dept. Agric. Handb. 399: 72-76, ills., 1972). **T:** Mexico, Sonora (Gentry & Arguelles 16637 [US, DES, MEXU]). – **D:** Mexico (Sonora).

Related to other Sonoran species of Group *Serru-*

latae (as *Amolae*) (*A. vilmoriniana*, *A. chrysoglossa*), based on the smooth narrow leaves with unarmed margins, the prolifically flowering inflorescences and the small slender yellow flowers with shallow tubes and tepals clasping the filaments (Gentry 1982: 78).

A. ocahui var. **longifolia** Gentry (Agaves Cont. North Amer., 78, ills. (p. 79-80), 1982). **T:** Mexico, Sonora (Gentry 11610 [US, DES]). – **D:** Mexico (E-C Sonora); scattered in the mountain region.

[1b] Differs from var. *ocahui*: Stem thick and round; **Ros** solitary; **L** linear-lanceolate, straightly ascending or recurving, sometimes falcate, mature **L** 60 - 80 (-90) × 2 - 3 (near the base) cm.

These larger, more robust and longer-leaved plants maintain these features even when cultivated together with the shorter-leaved var. *ocahui*. Varietal status is appropriate since they appear not to be geographically isolated from var. *ocahui* (Gentry 1982: 78-79).

A. ocahui var. **ocahui** – **D:** Mexico (NE Sonora); cliffs and outcrops of volcanic rocks, 500 - 1500 m. **I:** Gentry (1982: 67, 76-77). **Fig. V.f**

[1b] Stem short; **Ros** dense, green, *Yucca*-like, 0.3 - 0.5 × 0.5 - 1 m, solitary; **L** numerous, linear-lanceolate, erect to ascending, some older **L** declined or falcate, mostly stiff, widest at the base, plane above, surface smooth, minutely and densely punctate in fine lines, 25 - 50 × 1.5 - 2.5 cm, green, margins straight, lined with a narrow reddish-brown firm border detachable in dried **L**; marginal teeth none; terminal **Sp** weak, rather brittle, 1 - 2 cm, pruinose-grey over brown; **Inf** slender, ± 3 m, 'spiculate', scape with numerous narrow chartaceous **Bra**, densely flowered from 1 - 1.5 m above the base, part-**Inf** with geminate **Fl**; **Fl** 30 - 38 mm; **Ov** 15 - 20 mm, neck constricted; **Tep** yellow, tube broadly funnel-shaped, 2 - 4 mm, lobes subequal, 14 - 16 mm.

A. ornithobroma Gentry (Agaves Cont. North Amer., 117-119, ills., 1982). **T:** Mexico, Sinaloa (Gentry 18358 [US, DES]). – **Lit:** McVaugh (1989). **D:** Mexico (Sinaloa, Nayarit); hot tropical lowland savanna.

[1d] Stem short; **Ros** asymmetrical, small, solitary to caespitose, suckering sparingly at maturity; **L** few, narrowly linear, straight-ascending to frequently curving to one side of the **Ros**, or falcate, short-acuminate, convex below from the base to the tip, convex above from the base to the middle of the lamina, smooth, 60 - 75 × 0.5 - 0.8 cm, light green to reddish, margins filiferous, reddish to white; terminal **Sp** subulate, weak, fraying, 0.6 - 1 cm; **Inf** 2.5 - 3 m, 'spicate', slender, laxly flowered in the upper ½ of the **Inf**, part-**Inf** with geminate **Fl**; **Ped** 5 - 8 mm; **Fl** slender, 30 - 48 mm; **Ov** small, 12 - 17 mm; **Tep** green with reddish or purplish flush, tube

narrowly funnel-shaped, triquetrous, 9 - 13 mm, lobes about equal, 10 - 17 mm. – *Cytology:* 2n = 180.

Closely related to *A. geminiflora*, but separable by its caespitose habit, small few-leaved rosettes and slender inflorescences with small flowers (Gentry 1982: 118).

A. oroensis Gentry (Agaves Cont. North Amer., 294-296, ills., 1982). **T:** Mexico, Zacatecas (Gentry & Enghard 23592 [US, DES, MEXU]). – **D:** Mexico (N Zacatecas); cultivated only.

[2a] **Ros** low, openly spreading, solitary or suckering; **L** linear-lanceolate, straight to recurving, narrow and thickly convex below towards the base, long-acuminate, guttering upwards, slightly asperous, 80 - 100 × 8 - 10 cm, green, margins straight to repand; marginal teeth mostly straight, 3 - 6 mm (middle of the lamina), greyish, mostly 2 - 3 cm apart, smaller and more closely spaced towards the **L** base; terminal **Sp** acicular, narrowly grooved above for ½ of its length, 2.5 - 3 cm, greyish, finely decurrent to the uppermost teeth; **Inf** 5 - 6 m, 'paniculate', part-**Inf** laxly flowered, spreading, 12 - 16; **Fl** very slender, 70 - 75 mm; **Ov** fusiform, 34 - 37 mm, greenish, neck grooved; **Tep** pink in bud, opening yellow, tube 16 - 18 mm, lobes unequal, 20 - 21 mm.

A local cultivar well-characterized by its thick narrow green leaves and esp. the broad open pink-budded panicles with flowers with a tube constricted at the mouth (Gentry 1982: 294).

A. pachycentra Trelease (Trans. Acad. Sci. St. Louis 23(3): 135, 1915). **T:** Guatemala, Dept. Progreso (Trelease 2 [ILL]). – **D:** S Mexico (Oaxaca, Chiapas), Guatemala, El Salvador, Honduras; tropical deciduous forest, thorn forest, 300 - 1240 m. **I:** Gentry (1982: 486-487).

Incl. *Agave eichlamii* A. Berger (1915); **incl.** *Agave eichlamii* var. *interjecta* A. Berger (1915); **incl.** *Agave opaciflora* Trelease (1915); **incl.** *Agave tenuispina* Trelease (1915); **incl.** *Agave weingartii* A. Berger (1915).

[2k] Stem short; **Ros** rather open, to 1 × 1.5 - 2 m, solitary, rarely surculose; **L** variable, broadly lanceolate, gradually narrowed towards the base, acuminate, plane to guttered, asperous above, rougher or scabrous below, mostly 60 - 100 × 12 - 18 cm, glaucous-white to yellowish or pale green, margins generally undulate, with sinuses between the teeth; marginal teeth variable, mostly 5 - 10 mm (middle of the lamina), brown, 1 - 3 cm apart, cusps straight or variously curved above low broad bases; terminal **Sp** finely subulate to nearly conical from a broad base, broadly to narrowly grooved above, scabrous, generally 4 - 6 cm, long-decurrent to the upper teeth; **Inf** 4 - 6 m, 'paniculate', open, rather irregular, scape usually crooked, young white-pruinose, part-**Inf** 20 - 30, small, on rather long stalks;

Fl 45 - 62 mm; **Ov** 25 - 35 mm, green, neck constricted, grooved; **Tep** yellow, **OTep** frequently reddish at the tips, tube 6 - 11 mm, lobes subequal, 13 - 20 mm. – *Cytology*: $2n = 120$.

Highly variable in leaf characters (Gentry 1982: 487).

A. palmeri Engelm (Trans. Acad. Sci. St. Louis 3: 319-320, 1875). – **D**: USA (Arizona, New Mexico), Mexico (N Sonora, Chihuahua); oak woodland and grama grassland, 930 - 1850 m. **I**: Gentry (1982: 423, 444). **Fig. V.g**

[2g] **Ros** rather open, 0.5 - 1.2 × 1 - 1.2 m, solitary, rarely suckering with age; **L** lanceolate, rather rigid, thick at the base, usually narrowed above the base, long-acuminate, convex below, somewhat guttered, mostly 35 - 75 × 7 - 10 cm, pale green to light glaucous-green or reddish-tinged, margins almost straight or undulate, with or without small tubercle-like bases to the teeth; marginal teeth variously curved, rather regular, slender, closely set, sometimes with smaller intermittent teeth; terminal **Sp** acicular, strong, shortly and openly grooved above the base, 3 - 6 cm, chestnut-brown or brown to aging grey; **Inf** 3 - 5 m, 'paniculate', broad, open, scape short, part-**Inf** horizontal, 8 - 12 in the upper ½ of the **Inf**; **Fl** narrow, 45 - 55 mm; **Ov** 25 - 30 mm, shiny green, neck short; **Tep** yellow to pink below, conspicuously red to brownish on the calloused tips, tube 12 - 14 mm, lobes dimorphic, outer 10 - 13 mm. – *Cytology*: $2n = 60$.

Shows introgression with *A. chrysantha* (see there) and *A. shrevei* (Gentry 1982: 446).

A. palustris (Rose) Thiede & Eggli (KuaS 50(5): 112, 1999). **T**: Mexico, Nayarit (Rose 1943 [US]). – **D**: Mexico (Nayarit); swamps. **I**: Rose (1903: fig. 1).

≡ *Polianthes palustris* Rose (1903).

[3b1] **R** unknown; basal **L** 2 - 4, base attenuate, parallel veins prominent, 20 - 30 × 0.8 - 1.5 cm, stem **L** 3 or 4, becoming much reduced above; **Inf** ± 0.4 m, 'spicate' with erect scape and 3 - 5 pairs of **Fl**; lower **Fl** sessile or to 5 mm pedicellate, upper **Fl** almost sessile; **Fl** scented like the cultivated tuberosity; **Tep** 30 - 60 mm, outcurved near the middle or just below, distally flaring, mouth of the tube very slightly oblique, lobes ovate, somewhat spreading, obtuse or obtusely pointed, 5 - 6 mm; **Anth** not exerted; **Fr** and **Se** unknown.

Known from the type collection only and never recollected (McVaugh 1989).

A. papyrocarpa Trelease (Mem. Nation. Acad. Sci. 11: 44, t. 95-97, 1913). **T**: Cuba, Isla de Pinos (Curtiss 335 [NY]). – **Lit**: Álvarez de Zayas (1985). **D**: Cuba (Isla de Pinos).

A. papyrocarpa ssp. **macrocarpa** A. Álvarez (Revista Jard. Bot. Nac. Univ. Habana 5(3): 7, ill.,

1985). **T**: Cuba, Isla de Pinos (Álvarez 43981A [HAJB]). – **D**: Cuba (Isla de Pinos).

[2m] Differs from ssp. *papyrocarpa*: **Inf** with less compact part-**Inf**; **Fr** larger.

Based on a single slightly differing population only. Its taxonomic separation appears doubtful.

A. papyrocarpa ssp. *papyrocarpa* – **Lit**: León (1946). **D**: Cuba (Isla de Pinos).

[2m] **Ros** solitary; **L** oblong to elongate-oblongate, gradually acute, somewhat concave, sometimes a little conduplicate above, 75 - 125 × 15 cm, at first slightly glaucous and rather dull, margins nearly straight or concave on young plants; marginal teeth straight or variously and unequally curved mostly downwards, triangular from scarcely or slightly dilated bases, 1 - 4 mm, 1 - 2.5 cm apart, occasionally with 1 or several minute intermittent teeth; terminal **Sp** usually a little curved and somewhat conically subulate, narrowly grooved below the middle, smooth or slightly granular below, somewhat polished towards the end, 0.8 - 1.5 cm, brown, not decurrent; **Inf** 4 m, 'paniculate', part-**Inf** few, very laxly arranged on slender outcurved **Br** in the upper ½ or more of the **Inf**; **Fl** ± 40 mm; **Ov** fusiform, 20 mm; **Tep** light yellow, tube conical, 4 mm, lobes 15 mm; **Fr** globose-oblong, not stipitate and little beaked, thin-walled, 2 - 2.5 × 1.5 - 2 cm.

A. parrasana A. Berger (Notizbl. Königl. Bot. Gart. Berlin 4: 250, 1906). **T**: Mexico, Coahuila (*Purpus* s.n. [US]). – **D**: Mexico (SE Coahuila); limestone mountains, 1400 - 2480 m. **I**: KuaS 43(5): centre page pullout 1992/15.

Incl. *Agave wislizeni* ssp. *parrasana* (A. Berger) Gentry (1975) (*incorrect name*, Art. 11.4).

[2i] **Ros** compact, small, 30 - 50 cm Ø, solitary, with few or no suckers; **L** 40 - 60 per **Ros**, ovate, closely imbricate, thick, rigid, short-acuminate to merely acute, plane to concave above, generally 20 - 30 × 10 - 15 cm, frequently light grey to bluish-glaucous; marginal teeth straight to curved, slender from small low bases, 5 - 10 (-15) mm, largest near the **L** tip, rapidly becoming smaller further down, greyish-brown, 1 - 2.5 cm apart; terminal **Sp** slender from a broad base, flat to openly grooved above, 2 - 3 (-4) cm, dark brown to greyish, sharply decurrent to the uppermost teeth; **Inf** 3 - 4 m, 'paniculate', ellipsoid, part-**Inf** compact, 10 - 15; **Fl** 50 - 60 mm; **Ov** 25 - 30 mm, neck short, not constricted; **Tep** flushed red or purple, opening pale yellow, tube cylindrical, 13 - 14 mm, lobes subequal, 13 - 15 mm.

Easily distinguished by its short, broad, abruptly short-acuminate leaves. It differs from all other taxa in Group *Parryanae* by its purplish-coloured large succulent bracts on the scape, which cover the budding part-inflorescences (Gentry 1982: 538).

A. parryi Engelm (Trans. Acad. Sci. St. Louis

3(20): 311-313, 1875). **T:** USA, Arizona (*Rothrock* 274 [MO]). – **Lit:** Ullrich (1992f). **D:** SW USA, NW Mexico.

≡ *Agave applanata* var. *parryi* (Engelmann) Mulford (1896).

Distinguished by its compact, freely suckering, many-leaved, light green to greyish rosettes (Gentry 1982: 539). Berger (1915: 179) ascribed the name to Haage & Schmidt (Cat., 14, 1873). The name *A. scabra* Salm-Dyck 1858, though inappropriate as to its meaning, would have priority but is an illegal later homonym (Ullrich 1992f). The 3 varieties recognized by Gentry (l.c., 542 etc.) were synonymized by Ullrich (1992f), as they were regarded as mere ecotypes with size modified by more humid or arid conditions and merging into typical plants in cultivation, as also stated by Gentry. His decision is based on mere literature study, and the varieties were recently accepted by Hodgson (1999), and this is followed here.

A. parryi var. **couesii** (Engelmann ex Trelease) Kearney & Peebles (J. Washington Acad. Sci. 29(11): 474, 1939). – **D:** USA (C Arizona); open slopes in grassland and pine-oak woodland, 1100 - 2100 m. **I:** Gentry (1982: 542).

≡ *Agave couesii* Engelmann ex Trelease (1911); **incl.** *Agave parryi* fa. *integrifolia* Breitung (1963).

[2i] Differs from var. *parryi*: **Ros** 35 - 55 × 40 - 65 cm; **L** smaller, 25 - 42 (-47) × 6.5 - 11 cm; **Fl** smaller, 43 - 58 (-60) mm; **Ov** 20 - 34 mm; **Tep** tip more densely papillate, tube 6 - 9 mm. – *Cytology*: 2n = 120.

This taxon represents a variant of smaller growth from the NW border of the species' range. However, small-leaved forms occur at random elsewhere (Gentry 1982). *A. parryi* fa. *integrifolia* represents a toothless variant found in populations of this variety; such aberrations are widespread in the genus and do not merit formal taxonomic recognition. The taxon hybridizes with *A. chrysantha* (Hodgson 1999).

A. parryi var. **huachucensis** (Baker) Little ex Benson (Amer. J. Bot. 30(3): 235, 1943). **T:** USA, Arizona (*Pringle* s.n. [K, NY]). – **D:** USA (SE Arizona); Mexico (NE Sonora, W Chihuahua?); open slopes in oak woodland and pine forests, 1550 - 2150 m.

≡ *Agave huachucensis* Baker (1888) ≡ *Agave applanata* var. *huachucensis* (Baker) Mulford (1896).

[2i] Differs from var. *parryi*: **Ros** more robust, 45 - 75 × 75 - 85 cm; **L** larger, 32 - 65 × 10 - 20 cm; **Inf** broader; **Fl** larger, 62 - 81 mm; **Ov** 34 - 47 mm; **Tep** tube 8 - 9 mm.

An upland variant with larger growth.

A. parryi var. **parryi** – **D:** USA (C and SE Arizona, SW New Mexico), Mexico (W Chihuahua, W Durango); open rocky slopes in grama grasslands,

oak woodland, pine-oak-forest, and chaparral, 1200 - 2800 m. **I:** Gentry (1982: 522, 540); KuaS 42(11): centre page pullout 1991/32. **Fig. VI.d**

Incl. *Agave parryi* ssp. *parryi*; **incl.** *Agave scabra* ssp. *scabra*; **incl.** *Agave americana* var. *latifolia* Torrey (1859); **incl.** *Agave scabra* Salm-Dyck (1859) (*nom. illeg.*, Art. 53.1); **incl.** *Agave wislizeni* Engelmann (1875) (*nom. illeg.*, Art. 52.1); **incl.** *Agave marcusii* De Smet (1876); **incl.** *Agave noah* Nickels (1894); **incl.** *Agave chihuahuana* Trelease (1911); **incl.** *Agave patonii* Trelease (1911); **incl.** *Agave marcusea* hort. ex Trelease (1912); **incl.** *Agave marenzii* hort. ex Trelease (1912); **incl.** *Agave parayi* hort. ex Trelease (1912) (*nom. inval.*, Art. 61.1); **incl.** *Agave parreyi* hort. ex Trelease (1912) (*nom. inval.*, Art. 61.1); **incl.** *Agave paryi* hort. ex Trelease (1912) (*nom. inval.*, Art. 61.1); **incl.** *Agave payrii* hort. ex Trelease (1912) (*nom. inval.*, Art. 61.1).

[2i] **Ros** compact, globose, (35-) 40 - 60 × 60 - 75 cm, freely suckering; **L** 100 - 160 per **Ros**, linear-ovate, closely imbricate, rigid, thick, short-acuminate, mostly (18-) 25 - 50 × (4.5-) 8 - 12 cm, glaucous-grey to light green; marginal teeth mostly rather straight on a nearly straight margin, small, largest above the middle of the lamina, 3 - 7 mm, dark brown to greyish, mostly 1 - 2 cm apart; terminal **Sp** nearly flat above, 1.5 - 3 cm, dark brown to grey with age, decurrent to the 1. or 2. teeth; **Inf** 4 - 6 m, 'paniculate', stout, part-**Inf** stout, 20 - 36 in the upper ½ of the **Inf**; **Fl** mostly 60 - 77 mm; **Ov** (27-) 30 - 47 mm, neck long, 6 - 9 mm, mildly constricted and grooved; **Tep** pink to red in bud, opening yellow, tube 9 - 12 mm, lobes subequal, 18 - 24 mm; **Fr** on stout **Ped**, 3.5 - 5 × 1.5 - 2 cm, shortly stipitate, beaked, strong-walled; **Se** 7 - 8 × 5 - 6 mm, semicircular in outline. – *Cytology*: 2n = 60, 120.

A. parryi var. **truncata** Gentry (Agaves Cont. North Amer., 543-545, ill., 1982). **T:** Mexico, Zacatecas-Durango (Gentry & Gilly 10566 [US, DES, MEXU, MICH]). – **D:** Mexico (Durango / Zacatecas border); only known from the region of the type locality, 2450 m.

[2i] Differs from var. *parryi*: **L** very small (sometimes only 7 - 15 cm long), broad, tip acute to truncate.

A diminutive variant at the SE border of the species's range.

A. parvidentata Trelease (J. Washington Acad. Sci. 15(17): 395, 1925). **T:** El Salvador (*Calderon* 2085 [US 1169884-5]). – **D:** El Salvador. **I:** Gentry (1982: 488).

Incl. *Agave compacta* Trelease (1927).

[2k] **Ros** subcaulescent, dense, to 1 × 1.7 m, solitary; **L** numerous, ascending to out- or incurving, ovate-lanceolate, contracted into the thick base, plane, acuminate, 80 - 100 × 15 - 25 cm, pale green

to light grey-glaucous, margins straight; marginal teeth deltoid from lenticular bases, nearly straight, 3 (-5) mm (middle of the lamina), 1 - 2 cm apart, reduced up- and downwards; terminal **Sp** acicular, involutely grooved to above the middle, smooth, $\pm$ 5 cm, dull light brown, decurrent for more than its length; **Inf** $\pm$ 2.5 m, 'paniculate', dense, oblong, scape short, part-**Inf** globose, > 30 , bulbilliferous; **Fl** slender, 40 - 50 mm; **Ov** fusiform, 20 - 25 mm; **Tep** yellow, tube openly conical, $\pm$ 5 mm, lobes subequal, 15 - 20 mm.

Closest to *A. pachycentra* and *A. wercklei*. Characteristic are its very short-peduncled inflorescences branching from the level of the upper leaf tips (Gentry 1982: 488). Similar plants exhibiting this feature also occur in Chiapas (Mexico) (Ullrich 1992a). Ullrich (l.c.) proposes *A. calderonii* Trelease (1923) as oldest name for *A. parvidentata*. Lott & García-Mendoza (1994), however, treat *A. calderonii*, which is known from the type collection only, as a name of doubtful identity tentatively assignable to Group *Vivipara* (as *Rigidae*).

A. parviflora Torrey (in Emory, Rep. US Mex. Bound. 214, 1859). **T:** Mexico, Sonora (*Schott* s.n. [US, NY]). – **D:** USA (Arizona), Mexico (Sonora).

A. parviflora ssp. **flexiflora** Gentry (US Dept. Agric. Handb. 399: 56-57, 1972). **T:** Mexico, Sonora (Gentry 16638 [US, DES, MEXU]). – **D:** Mexico (Sonora); grama grasslands, 650 - 1500 m. **I:** Gentry (1982: 196, 202).

[1e] Differs from ssp. *parviflora*: **L** dimorphic, linear to lanceolate, 6 - 10 $\times$ 1 cm or 15 - 18 $\times$ 1.2 cm; terminal **Sp** whitish; **Inf** 1.5 - 2.5 m, part-**Inf** with 1 - 3 (mostly 2) **Fl**; **Fl** saccate; **Tep** with **Anth** and **Sty** bent downwards at anthesis; **Ov** 6 - 8 mm, tube 3 - 4 mm, lobes 3.5 - 5 mm.

A. parviflora ssp. **parviflora** – **Lit:** Ullrich (1990f: with ill.). **D:** USA (Arizona), Mexico (Sonora). **I:** Gentry (1982: 196, 202-203).

Incl. *Agave hartmanii* S. Watson (1891).

[1e] **Ros** very small, 10 - 15 $\times$ 15 - 20 cm, solitary or caespitose; **L** oblong-linear, widest at or above the middle, convex below, plane above, 6 - 10 $\times$ 0.8 - 1 cm, green, both faces with white impressions from the central bud, margins conspicuously white-filiferous; marginal teeth minute, near the **L** base only; terminal **Sp** weakly subulate, 5 - 8 mm, brown to greyish-white; **Inf** 1 - 1.8 m, 'spicate', laxly flowered through the upper $\frac{1}{2}$, this part frequently reddish, part-**Inf** with 2 - 4 **Fl**; **Fl** 13 - 15 mm; **Ov** proper 4 - 5 mm, neck 2 mm; **Tep** pale yellow, tube urceolate, 5 mm, lobes slightly unequal, 2 - 3 mm.

This taxon has the smallest flowers in the genus. It is closely related to *A. polianthiflora* from which it is only separable with certainty by the distinctive flowers (Gentry 1982: 201).

A. $\times$ peacockii Croucher (Gard. Chron. 1873: 1400, fig. 283, 1873). **T:** [icon]: Curtis's Bot. Mag. 1901: t. 7757. – **D:** Mexico (Hidalgo, Puebla, Oaxaca); calcareous hills. **I:** Gentry (1982: 126, 166). $\equiv$ *Agave ghiesbreghtii* var. *peacockii* (Croucher) A. Terracciano (1885) $\equiv$ *Agave roezliana* var. *peacockii* (Croucher) Trelease (1920).

A. $\times$ peacockii is the putative natural hybrid between the sympatric *A. kerchovaei* and *A. marmorata*. This is above all suggested by the inflorescences that are intermediate between Subgen. *Littaea* and Subgen. *Agave* (Gentry 1982: 165-166). A detailed morphometric analysis was provided by Valverde & al. (1996).

A. pedunculifera Trelease (CUSNH 23: 134, 1920). **T:** Mexico, Sinaloa (*Rose* 1713 [US]). – **Lit:** McVaugh (1989). **D:** Mexico (Sinaloa, Nayarit, Jalisco, Michoacán, Guerrero, Oaxaca); mountain slopes in tropical deciduous or oak forest, 300 - 2200 m. **I:** Gentry (1982: 67, 80-81).

[1b] **Ros** caulescent, solitary; **L** symmetrically ascending-horizontal, soft, thickened, narrowed and convex at the base, plane to concave, mostly ovate-acuminate and 50 - 70 $\times$ 15 - 18 cm, or lanceolate and 80 - 90 $\times$ 11 - 15 cm, pale green to glaucous-white, margins narrowly lined with brown or white, with close denticles 0.5 - 2 mm long, otherwise smooth; terminal **Sp** acicular, weak, $\pm$ 1 cm; **Inf** erect or recurving, 2 - 3 m, 'spicate', flowering from near the **L** tips, part-**Inf** with 2 or 4 **Fl**; **Ped** geminate; **Fl** slender, 37 - 52 mm; **Ov** cylindrical, slender, 20 - 27 mm, neck not constricted; **Tep** yellow, tube shallowly funnel-shaped, 2 - 6 mm, lobes equal, $\pm$ 22 mm.

Closely related to *A. attenuata* based on leaf and flower characters, but distinguished by being nearly stemless throughout all observed populations. *A. pedunculifera* exhibits considerable variability in leaf form and size and depth of the flower tube, but the different forms are linked by intermediates (Gentry 1982: 80).

A. pelona Gentry (US Dept. Agric. Handb. 399: 76-80, ill., 1972). **T:** Mexico, Sonora (Gentry & Arguelles 19898 [US, DES, MEXU]). – **Lit:** Turner & al. (1995). **D:** Mexico (Sonora); limestone rocks and cliffs. **I:** Gentry (1982: 170).

[1g] **Ros** subcaulescent, compact, 40 - 60 $\times$ 60 - 80 cm, solitary; **L** many, linear-lanceolate, erect to ascending, thick, stiff, sometimes slightly narrowed towards the base, long-acuminate, rounded below, plane above, epidermis smooth, minutely punctate, waxy, 35 - 50 $\times$ 3 - 5 cm, shiny dark green, turning reddish to purplish during drought or with age, margins with smooth white firm border; marginal teeth none; terminal **Sp** strong, sharp, sharply angled below, grooved or plane above, 4 - 7 cm, white to reddish, decurrent as a white border down the **L** margins; **Inf** 2 - 3 m, 'spicate', flowering through

the upper $\frac{1}{2}$, part-**Inf** with geminate **Fl**; **Ped** 30 - 50 mm; **Fl** campanulate, 45 - 50 mm; **Ov** slender, 20 mm incl. neck, light green; **Tep** dark red, tube openly funnel-shaped, 8 - 9 mm, lobes 18 mm.

Without close relatives in Group *Marginatae* and geographically isolated from its remaining species. It may, however, be misplaced in this group and perhaps belongs to Group *Filiferae*, as indicated by its funnel-shaped flower tube with nectariferous inner lining and red tepals with recurved lobes (Gentry 1982: 169).

A. pendula Schnittspahn (Z. Gartenbau-Vereins Darmstadt 6: 7, 1857). **T** [neo]: Ex cult. (*Anonymus* s.n. [K]). – **D**: Mexico (Veracruz, Chiapas). **I**: Gentry (1982: 217, 227-228).

Incl. *Agave aloina* Koch (1860); **incl.** *Agave sartorii* Koch (1860); **incl.** *Agave pulcherrima* hort. ex C. Koch (1865) (*nom. illeg.*, Art. 53.1); **incl.** *Agave rubrocincta* Jacobi (1868); **incl.** *Agave rufocincta* Jacobi (1868); **incl.** *Agave caespitosa* Todaro (1876) $\equiv$ *Agave sartorii* var. *caespitosa* (Todaro) A. Terracciano (1885).

[1f] Stem short; **Ros** open, spreading, branching axillary; **L** 20 - 30, slenderly lanceolate, softly fleshy, ascending to somewhat outcurving, rounded below, plane to concave above, 50 - 75 $\times$ 5 - 11 cm, green to yellow-green, frequently with pale yellow central stripe, margins not horny, denticulate with brown denticles $\pm$ 1 mm long; terminal **Sp** small, 5 - 8 mm, brown, not decurrent; **Inf** 1.3 - 1.8 m, 'spicate', slender, drooping, laxly flowered in the upper $\frac{1}{3}$ - $\frac{1}{2}$ of the **Inf**, part-**Inf** with solitary or geminate **Fl**; **Fl** 30 - 45 mm; **Ov** 10 - 15 mm, neck short, not constricted; **Tep** greenish or tinged with lavender, whitish inside, tube funnel-shaped, 6 - 13 mm, lobes about equal, 14 - 16 mm. – *Cytology*: $2n = 60$.

Very distinctive with its overhanging inflorescence. In contrast to Gentry (l.c.), Berger (1915: 60) regards *A. sartorii* as an earlier valid name for this taxon, since he cites *A. pendula* as 'Schnittspahn ex Jacobi 1865'. This nomenclatural problem needs further study.

A. petiolata Trelease (Mem. Nation. Acad. Sci. 11: 20, t. 8, 1913). **T**: Curaçao (*Boldingh* A8 [MO?]). – **Lit**: Hummelinck (1993: with ills.). **D**: Leeward Islands (Curaçao).

Incl. *Agave lurida* Hamelberg (1898) (*nom. illeg.*, Art. 53.1).

[2q] **Ros** caulescent for < 1 m, suckering (?); **L** lanceolate, rather abruptly contracted into a long neck at the base, gradually acute, $\pm$ 110 $\times$ 17 cm, blue-glaucous, margins nearly straight between the teeth or prominences; marginal teeth straight or variously curved, narrowly triangular from half-round bases 5 - 10 mm wide and sometimes raised on abrupt green prominences, teeth 5 mm, purplish-chestnut-brown, 1.5 - 3 (-5) cm apart; terminal **Sp** acicular, $\pm$ flexuous, round-grooved to or

beyond the middle, granular-roughened below, smooth and polished towards the tip, 2.5 - 6 cm, chestnut-brown, shortly decurrent; **Inf** unknown; **Fl** 35 - 40 mm; **Ov** fusiform, 15 mm, tube open, 5 mm, lobes 15 mm; **Fr** unknown.

A curious plant, in leaf armature suggesting some of the Mexican species grown for Pulque (Trelease l.c.).

A. petrophila García-Mendoza & E. Martínez (Sida 18(2): 627, 1998). **T**: Mexico, Guerrero (*Martínez & al.* 2639 [MEXU, BRIT, ENCB, K, MO]). – **Lit**: García-Mendoza & Martínez Salas (1998: with ills.). **D**: Mexico (Guerrero, Oaxaca); rocky slopes on calcareous soil, 850 - 1300 m.

Incl. *Agave gracilis* García-Mendoza & E. Martínez (1998) (*nom. illeg.*, Art. 53.1).

[1a] Stems procumbent, to 1 m; **Ros** semiglobose, compact, 50 - 80 cm $\varnothing$, caespitose; **L** > 100 per **Ros**, linear, plane, flexible, subcoriaceous, with longitudinal striae, 40 - 70 $\times$ 0.4 - 0.9 cm, glaucous to glaucous-green, margins yellowish, finely denticulate; terminal **Sp** weak, brownish-reddish; **Inf** 1.8 - 2 m, 'spicate', erect or slightly inclined, **Fl** in the upper $\frac{1}{4}$ - $\frac{1}{2}$ of the **Inf**; **Ped** 1 mm; **Fl** campanulate, 20 - 22 (-25) mm; **Ov** cylindrical, 7 - 10 $\times$ 2 - 4 mm, slightly penetrating into the **Tep** tube; **Tep** oblong, 9 - 11 $\times$ 2.5 - 3.5 (-4.5) mm, green, tips dark reddish, tube 3 - 4 mm; **Fr** globose, 0.9 - 1 $\times$ 0.8 - 0.9 cm, dark brownish; **Se** 3 - 3.5 $\times$ 2 - 2.5 mm black.

This taxon shares morphological characteristics with *A. dasylirioides*, but differs in its small caespitose rosettes, smaller and narrower leaves, erect or slightly inclined inflorescences, much smaller flowers and smaller and globose fruits (García-Mendoza & Martínez Salas 1998). The species was first illegitimately named *A. gracilis* (l.c.). A plant from Oaxaca referred to *A. dasylirioides* by Ullrich (1990g) may belong here.

A. planifolia S. Watson (Proc. Amer. Acad. Arts 22: 479, 1887). **T**: Mexico, Chihuahua (*Pringle* 1141 [GH, VT]). – **D**: Mexico (Sonora, Chihuahua); sandy banks near streams and in oak wood regions, fall-flowering.

$\equiv$ *Manfreda planifolia* (S. Watson) Rose (1903) $\equiv$ *Polianthes planifolia* (S. Watson) Shinnars (1966).

[3a3] Plants medium-sized (for Subgen. *Manfreda*); rhizome globose; **L** 4 - 5, spreading-arching, oblong to elliptic, narrowed towards the clasping basal pseudopetiole, tip acuminate, with a short point, channelled in the petiolar portion and at the tip, nearly flat in the middle, semisucculent, drying leathery, smooth, 21 - 30.5 $\times$ (2.5-) 3.1 - 6.1 cm, unspotted, margins with a narrow hyaline band, minutely regularly denticulate; remains of **L** bases coarsely fibrous, surrounding the rhizome, 3.8 - 5 cm; **Inf** 1.2 - 1.5 m, 'spicate', flowering part short, 11 cm in cultivation, with 6 - 14 sessile **Fl**; mature **Fl** spreading; **Ov** 15 mm; **Tep** tube cylindrical, at a

slight angle to the **Ov**, 5 - 7 mm, lobes oblong, reflexed, 12 - 19 mm; **Sty** exceeding the tube by ± 5 mm; **Sti** clavate, trigonous; **Fr** ovoid, 1.8 cm; **Se** 5 mm.

Probably most closely related to *A. guttata*, but distinctive because of its elliptic leaves with the appreciably narrowed and clasping base and acuminate tip, as well as the more N range (Verhoek-Williams 1975: 257).

A. platyphylla (Rose) Thiede & Eggli (KuaS 50(5): 112, 1999). **T:** Mexico, Jalisco (*Rose* 2598 [US]). – **Lit:** McVaugh (1989: with ill.). **D:** Mexico (S Durango, S Zacatecas, Jalisco); grasslands, rocky mesas among grasses, hillsides in pine-oak forests, 1500 - 2500 m, flowers August to November. **I:** Rose (1903).

= *Polianthes platyphylla* Rose (1903).

[3b1] Plants glabrous; **R** fleshy, tapering, to 3 - 7 cm, in dense clusters at the base of the bulbs; **L** 2 - 10 in a basal **Ros**, lying flat on the ground, lanceolate-elliptic to narrowly ovate, base narrowed to form a shortly subpetiolate part 5 mm wide or less, tip long-acute, 7 - 15 (excl. base) $\times$ 1.2 - 3 cm, margins narrow, smooth, hyaline, **L** bases imbricate, broadly expanded, rigid, chestnut-brown or yellowish, forming a narrowly ovoid bulb; **Inf** 40 - 70 cm, 'spicate', flowering part 10 - 20 cm, with few- to 10-flowered nodes; **Fl** essentially sessile, becoming horizontal or deflexed; **Ov** ellipsoid, erect at anthesis or nearly so; **Tep** white or cream-coloured, shaded with rose at the base, or lobes pink, whole **Tep** pink with age, finally deep rose, tube strongly curved outwards just above the **Ov**, 1.5 mm $\varnothing$ near the base, 2.5 - 3 mm $\varnothing$ at **Fil** insertion, mouth oblique, 13 - 16 mm, lobes subequal, rounded or ovate, 2 - 2.5 (-3) mm; **St** included; **Sty** slightly exerted at maturity, with 3 flat obtuse lobes 1 - 1.3 mm long; **Fr** broadly ellipsoid to subglobose, $\pm 0.7 - 1 \times 0.7 - 1$ cm; **Se** 2.5 - 3 mm.

A. polianthes Thiede & Eggli (KuaS 52: [in press], 2001). – **Lit:** McVaugh (1989); Ullrich (1993b: with ill.). **D:** Cultivated only and not known from the wild.

Incl. *Polianthes tuberosa* Linné (1753) $\equiv$ *Agave tuberosa* (Linné) Thiede & Eggli (1999) (*nom. illeg.*, Art. 53.1); **incl.** *Polianthes gracilis* Link (1821) $\equiv$ *Polianthes tuberosa* var. *gracilis* (Link & Otto) Baker (1888); **incl.** *Polianthes tubulata* Sessé & Moçino (1894); **incl.** *Polianthes tuberosa* fa. *plena* Moldenke (1948).

[3b1] Plants glabrous; **R** fleshy; **L** 6 - 10 in a basal **Ros** from a bulbous base, linear, soft, deeply channelled in the basal $\frac{1}{2}$, to 30 - 60 $\times$ 1 - 1.5 cm, bright green, sometimes reddish near the base, sometimes with brown spots on the lower face; **Inf** 60 - 100 cm, 'spicate', flowering part 20 cm or more, laxly flowered, with up to 20 or more flowering nodes with paired **Fl**; **Fl** mostly sessile,

fragrant, 25 - 40 mm; **Tep** waxy white, base upright or strongly ascending, tube smoothly outcurved from below the middle, funnel-shaped above the curvature, expanding to the very slightly oblique mouth, there 7 - 8 mm $\varnothing$, lobes subequal, elliptic-ovate, obtusely pointed, often 15 - 18 $\times$ 7 - 10 mm; **St** included; **Sty** included, with 3 oblong-ovate recurved lobes 2.5 mm long.

This is the "Tuberosa" or "Nardo" grown in large quantities for the flower market, cultivated in Europe at least since 1601, when it was first illustrated by Clusius. Old European illustrations are discussed by Ullrich (1993b). Especially common is a form with double ('filled') flowers, *Polianthes tuberosa* fa. *plena* Moldenke 1948, which should better be treated as cultivar *Agave polianthes* 'Plena'. The species is at present not known from the wild and already Linné based his description on cultivated material from India. It is most probably of Mexican origin and possibly native to the region around Guadalajara in the state of Jalisco, where its putative ally *A. dolichantha* has recently been rediscovered in the wild (see note there).

A. polianthiflora Gentry (US Dept. Agric. Handb. 399: 51-54, ill., 1972). **T:** Mexico, Chihuahua (*Gentry* 8013 [US, DES, MEXU]). – **D:** Mexico (Sonora, Chihuahua); rock outcrops in pine-oak forest, 1250 - 2000 m. **I:** Gentry (1982: 196, 202-203); KuaS 40(12): centre page pullout 1989/36. **Fig. V.a, V.b**

[1e] **Ros** small, 10 - 20 $\times$ 20 - 30 cm, solitary or caespitose; **L** linear-lanceolate, widest in the middle, convex below, plane above, 10 - 20 $\times$ 1 - 1.3 cm, green, both faces with white impressions from the central bud, margins conspicuously white-filiferous; marginal teeth minute, near the **L** base only; terminal **Sp** weak, 0.7 - 1 cm, greyish; **Inf** 1.2 - 2 m, 'spicate', axis red, part-**Inf** in the upper $\frac{1}{2}$ of the **Inf**, usually with 2 (or 1 or 3) **Fl**; **Ped** short; **Fl** 37 - 42 mm; **Ov** 9 - 12 mm, red; **Tep** pruinose, pink, tube long, very narrow and curved below, 22 - 32 mm, lobes subequal, 4 - 7 mm.

Differs from all other species of this subgenus by its long tubular flowers similar to those of the former genus *Polianthes* with very short lobes. Moreover, the flowers are not proterandrous, as in other Agaves.

A. portoricensis Trelease (Mem. Nation. Acad. Sci. 11: 38, t. 76-82, 1913). **T:** Puerto Rico (*Trelease* 7 p.p. [MO?]). – **D:** Puerto Rico, Culebra.

[21] **Ros** solitary; **L** broadly lanceolate, subacuminate, somewhat conduplicate-concave, 100 - 150 $\times$ 15 - 20 cm, dark green, glossy, $\pm$ lightly glaucous when young, margins $\pm$ concave; marginal teeth straight or retrorse, conspicuously triangular from lenticular bases, 2 - 5 mm, mostly 1.5 - 3 cm apart; terminal **Sp** conically subulate, somewhat curved, sometimes compressed from the sides and basally

thickened, shallowly grooved or involute nearly to the end, smooth, 1 - 1.5 (-2) cm, chocolate- or chestnut-brown, glossy, decurrent for several times its length and dorsally immersed into the green **L** tissue; **Inf** 5 - 6 m, 'paniculate', narrowly oblong, part-**Inf** on nearly horizontal **Br**, in the upper ½ or more of the **Inf**, bulbiferous; **Fl** ± 55 mm; **Ov** oblong-fusiform, 30 - 35 mm; **Tep** greenish-yellow, tube conical, ± 7 mm, lobes 15 mm; **Fr** subglobose, stipitate, ± beaked, 2.5 - 3 × 2 - 2.5 cm.

A. potatorum Zuccarini (Flora 15:2(Beiblatt 2): 96-97, 1832). – **D**: Mexico (Puebla, Oaxaca); semi-arid highlands with pine-oak forests, 1240 - 2300 m. **I**: Gentry (1982: 468, 491).

Incl. *Agave potatorum* var. *minor* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave scolymus* Karwinsky ex Salm-Dyck (1834); **incl.** *Agave elegans* hort. ex Salm-Dyck (1859); **incl.** *Agave latifolia* hort. ex Salm-Dyck (1859); **incl.** *Agave pulchra* hort. ex Salm-Dyck (1859); **incl.** *Agave quadrata* Lemaire (1864); **incl.** *Agave saundersii* Hooker fil. (1865); **incl.** *Agave verschaffeltii* Lemaire (1868) ≡ *Agave potatorum* var. *verschaffeltii* (Lemaire) A. Berger (1915); **incl.** *Agave auricantha* hort. ex Baker (1888).

[2k] **Ros** compact to openly spreading, small, solitary; **L** 50 - 80 (to >100) per **Ros**, ovate to shortly lanceolate, softly fleshy but rather rigid, thickened and narrowed towards the base, plane to somewhat hollowed above, mostly 25 - 40 × 9 - 18 cm, glaucous-white to green, margins undulate to deeply crenate with tubercle-like prominences, esp. above the middle of the lamina; marginal teeth on slender variously curved cusps from low broad bases, 5 - 10 mm and more, chestnut-brown to greyish-brown, mainly 1 - 3 cm apart; terminal **Sp** broad at the base, sharply pointed, sinuous, broadly grooved to flat above, 3 - 4.5 cm, chestnut-brown to greyish-brown, sharply decurrent as a ridge to the uppermost teeth; **Inf** 3 - 6 m, 'paniculate', **Bra** red to purplish, part-**Inf** small, compact, 15 - 30 in the upper ¼ - ½ of the **Inf**; **Fl** 55 - 80 mm; **Ov** 25 - 50 mm; **Tep** frequently tinged red or purplish in bud, light green to yellowish, tube cylindrical to funnel-shaped, 10 - 17 mm, lobes unequal, 13 - 24 mm.

A very polymorphic species widely distributed in horticulture.

A. potosina Robinson & Greenman (Proc. Amer. Acad. Arts 29: 393-394, 1894). **T** [lecto]: Mexico, San Luis Potosí (Pringle 3745 [GH, B, BM, BR, F, G, GH, K, M, MEXU, MO, NY, P, US, VT]). – **D**: Mexico (Coahuila, San Luis Potosí, Zacatecas); dry desert and limestone mesas, flowers in June. **I**: Piña Luján (1985: 29, 59-61).

≡ *Manfreda potosina* (Robinson & Greenman) Rose (1903) ≡ *Polianthes potosina* (Robinson & Greenman) Shinnars (1966); **incl.** *Delpinoa gracilima* Ross (1897).

[3a1] Plants small; rhizome 2 - 3.4 × to 1.1 cm; **R** very fleshy; **L** 2 - 7, fleshy, recurved, lanceolate, channelled, to 16 × 1.4 cm, margins with irregular cartilaginous teeth, these coarse, broad and usually truncate, blunt, usually incised at the tip, occasionally retrorse, 2 - 5 (-14) mm apart; remains of **L** bases covering the plant base, membranous, 4 - 9.5 cm; **Inf** (15.5-) 24 - 54 (-75) cm, 'spicate', flowering part 9 - 29.5 cm, semidense to open above, with 7 - 31 nodes, **Fl** rarely paired, erect, green; **Ov** ellipsoid, 3 - 6 mm; **Tep** tube straight, constricted above the **Ov**, 6 - 14 mm, lobes erect, 2 - 5 mm; **Fil** varying in length but falling in 2 size classes attached at the base and the middle of the tube, exceeding the tube; **Sty** equalling the tube; **Sti** clavate, trigonous; **Fr** ± globose, (0.9-) 1 - 1.3 (-1.5) × 0.8- 1.2 cm; **Se** 2 - 3 × 3 - 4 mm.

The short style and several lengths of the filaments are characteristic features of this species (Verhoek-Williams 1975: 184).

A. potrerana Trelease (CUSNH 23: 138, 1920). **T**: Mexico, Chihuahua (Pringle 802 [MO, B, NY, UC, US]). – **Lit**: McVaugh (1989). **D**: Mexico (Chihuahua, N Coahuila, Zacatecas); oak-pine grassland, 1500 - 2000 m. **I**: Gentry (1982: 126, 173).

[1g] **Ros** thick-stemmed, regularly spreading, 0.7 - 1 × 1.5 - 2 m, solitary; **L** numerous, lanceolate, straight, rigid, widest below the middle, convex below, roundly guttered above, mostly 40 - 80 × 6 - 7 cm, glaucous to light green, margins horny, continuous, straight, firm, brown towards the base, grey above; marginal teeth mostly straight, generally small, 2 - 4 mm, commonly 2 - 3 cm apart, lacking or reduced to serrations below the middle of the lamina; terminal **Sp** acicular, sharply angled below, flat to broadly canaliculate above, 2.5 - 4 cm, light brown to grey; **Inf** 4 - 7 m, 'spicate', stout, straight or arching, densely flowered through the upper ⅔, part-**Inf** with 2 - 4 **Fl**; **Ped** geminate, 4 - 15 mm; **Fl** 46 - 58 mm; **Ov** slender, 25 - 32 mm, neck smooth, constricted; **Tep** pink to red or yellow, tube 3 - 6 mm, lobes nearly equal, 17 - 24 mm.

Distinct and without close relatives in Group *Marginatae*. It differs by its solitary habit, tall inflorescences with large red flowers, and the long-acuminate leaves with reduced or lacking teeth on the lower ½ of the margin (Gentry 1982: 174).

A. pratensis A. Berger (Agaven, 37, 1915). **T**: Mexico, Nayarit (Rose 1994 [US, K, MEXU]). – **Lit**: McVaugh (1989). **D**: Mexico (Nayarit); small grassy openings along little streams, flowers in August; only known from the type collection.

Incl. *Manfreda rubescens* Rose (1903) ≡ *Polianthes rubescens* (Rose) Shinnars (1966).

[3a3] Plants small (for Subgen. *Manfreda*); **R** fibrous; rhizome oblong, ≥ 1.5 × 1.1 - 1.2 cm; **L** 3 - 6, erect, linear-lanceolate, tip acute, fibrous, 17.3 - 28 × 0.65 - 1 cm, green, unspotted, margins with a nar-

row white cartilaginous band, continuously minutely papillate, but smooth to the touch; remains of **L** bases forming a dense mass of fine stiff light brown fibres, 4.2 - 8 cm, previous year's **L** bases intact; **Inf** 60 - 85 cm, 'spicate', flowering part dense, 5.4 - 6.2 cm, with 5 - 9 sessile **Fl**; **Ov** ellipsoid, 7 - 10 mm; **Tep** dark (purple, fide Verhoek-Williams (1975: 245)), tube very short, 3 - 5 mm, connected to the **Ov** without constriction, lobes erect, 2 - 5 mm; **Sty** equalling the tube; **Sti** clavate, trigonous; **Fr** ± globose, (0.9-) 1 - 1.3 (-1.5) × 0.8- 1.2 cm; **Se** 2 - 3 × 3 - 4 mm.

This species is perhaps nearest to *A. guttata*, from which it differs by its purple (vs. greenish-yellow) flowers and its different leaves (Verhoek-Williams 1975: 246).

A. producta Thiede & Eggli (KuaS 50(5): 112, 1999). **T:** Mexico, Guerrero (*Chisholm* s.n. [US 11260]). – **D:** Mexico (Guerrero).

Incl. *Polianthes elongata* Rose (1903).

[3b1] Plants 80 - 90 cm tall; stem bulb-like at the base, bulb 1.2 - 3.5 cm Ø; **L** elongate, oblanceolate, 30 × 1 - 1.2 (near the tip) cm, green, hardly if at all glaucous, flat above, trough-shaped below; scape **L** 6 - 7, reduced above, becoming **Bra**-like; **Inf** 'spicate', with ≥ 20 geminate **Fl**, scape reddish at the base, glaucous above, glabrous throughout; **Bra** ovate-linear, acuminate, 10 - 15 mm, as long as the **Ped**, reddish; **Tep** overall 2 cm long, red, tube slender, curved just above the base and almost at a right angle to the axis of the **Ov**, lobes somewhat spreading, short, rounded; **Anth** tips just exceeding the mouth of the **Pet** tube; **Fr** and **Se** unknown.

A hardly known species. When transferring *Polianthes elongata* to *Agave*, a new name was necessary to avoid homonymy with *A. elongata* Jacobi (1865).

A. promontorii Trelease (Annual Rep. Missouri Bot. Gard. 22: 50, 1912). **T:** Mexico, Baja California (*Nelson & Goldman* 7437 [US]). – **D:** Mexico (Baja California Sur); granitic mountains, 900 - 1800 m. **I:** Gentry (1982: 310, 320).

[2d] Stem thick; **Ros** open, large, 1 - 2 and more × 2 - 2.5 m, solitary; **L** lanceolate, straight to arching, fleshy-succulent, stiff, thick at the base, usually concave above, 100 - 150 × 11 - 17 cm, green to light glaucous-green, margins ± straight; marginal teeth straight to curved, regular, mostly 4 - 8 mm, reddish-brown, 5 - 10 mm apart; terminal **Sp** conically subulate, narrowly sulcate above, 3 - 5 cm, dark brown, shortly decurrent; **Inf** 5 - 9 m, 'paniculate', massive, part-**Inf** diffuse, 25 - 30 in the upper ½ of the **Inf**; **Fl** campanulate, 60 - 75 mm; **Ov** 36 - 42 mm, neck narrowed; **Tep** red to purplish in bud, tube 14 - 15 mm, lobes equal, 14 - 16 mm.

Clearly distinct from both *A. aurea* and *A. capensis* in the size of leaves and inflorescences (Gentry 1982: 321).

A. pubescens Regel & Ortgies (Gartenflora 23: 227, t. 804, 1874). **T:** Ex cult. BG St. Petersburg (*Anonymus* s.n. [LE]). – **D:** Mexico (Morelos, Oaxaca, Chiapas); rocky slopes in mountain regions, 365 - 1830 m, flowers in August.

≡ *Agave brachystachys* var. *pubescens* (Regel & Ortgies) A. Terracciano (1885) ≡ *Manfreda pubescens* (Regel & Ortgies) Verhoek-Williams (1975) (*nom. inval.*, Art. 29.1).

[3a2] Plants medium-sized (for Subgen. *Manfreda*); **R** half-fleshy; rhizome cylindrical, 1.5 × 1.7 cm; **L** 3 - 4 (up to 9 in cultivation), lanceolate, coriaceous, recurved-spreading, slightly channelled, slightly undulate, tip acute, with a short point, 18 - 28 × 2.1 - 3.2 cm, upper face green, lower face paler, both faces spotted with dark brown and densely pubescent, margins with a narrow hyaline band, entire, revolute; remains of **L** bases 4.5 - 9.5 cm; **Inf** 63 - 184 cm, 'spicate', flowering part elongate, with 10 - 19 (nearly) sessile spreading-horizontal **Fl**; **Ov** ellipsoid, 7 - 12 mm; **Tep** green, tube narrowly funnel-shaped, nearly straight, 13 - 22 × 4 (middle of the tube) mm, lobes much revolute, 9 - 13 mm; **Sty** first bent downwards, at maturity straight, exerted for 23 - 45 mm; **Sti** clavate, trigonous; **Fr** oblong, ± 2 × 1.2 cm; **Se** unknown.

With the exception of *A. maculata* the only species in Subgen. *Manfreda* with pubescent leaves, but distinguished by its generally larger size and much more exerted stamens and styles (Verhoek-Williams 1975: 299). Further collections might, however, bridge the gap between both species.

A. pumila De Smet *ex* Baker (Handb. Amaryll., 172, 1888). **T:** US, DES, HBG. – **D:** Known from cultivation only. **I:** Gentry (1982: 175-176); KuaS 42(5): centre page pullout 1991/14.

Incl. *Agave simonis* hort. *ex* A. Berger (1915).

[1g] Plants dimorphic, **juvenile form** persisting for 8 - 12 years; **Ros** small, 5 - 8 cm Ø, surculose; **L** ovate-orbicular, thickly succulent, broader than long, base broadly clasping, rounded below, deeply concave above, 2 - 4 × 3 - 4 cm, greyish-green, upper face striped, margins thin, friable, white; marginal teeth several, weak and small; terminal **Sp** conical, flexuous, small; **mature form** thick-stemmed; **Ros** open, short, 40 - 50 × 60 - 70 cm, not suckering; **L** deltoid-lanceolate, rigid, patulous, tickened at the base, upper face concave, lower face convex, 30 - 38 × 4 - 4.5 cm, greyish-green, without stripes below, margins narrowly horny, detaching, white; marginal teeth small, weak, 1 - 2 mm, 1 - 1.5 cm apart; terminal **Sp** conical, slender, 1.5 cm, decurrent along the **L** edges and along the keel in the middle of the lower face; **Inf**, **Fl** and **Fr** unknown.

Long known only from the stunted juvenile form, but developing into large 'normal' rosettes when given enough space. Such a dimorphism is unknown in other *Agaves*. The plant may represent a

natural hybrid, probably *A. victoriae-reginae* × *A. lechuguilla* (Gentry 1982: 175).

A. revoluta Klotzsch (Allg. Gartenzeitung 8: 274, 1840). **T:** Ex cult. BG Berlin (*Anonymus* s.n. [B]). – **D:** Mexico (México); clay bluffs, flowers in July.

≡ *Manfreda revoluta* (Klotzsch) Rose (1903) ≡ *Polianthes revoluta* (Klotzsch) Shinnars (1966).

[3a2] Plants small (for Subgen. *Manfreda*); rhizome 1.8 cm Ø; **L** 5, linear-lanceolate, revolute, somewhat channelled, undulate, thin, tip broadly acute, with a short point, with a marked midrib region and closely set veins, 12.3 - 18.8 × 1.5 - 2 cm, margins with a narrow hyaline band, entire or finely papillate to erose-papillate; remains of **L** bases finely fibrous, 0.5 cm; **Inf** 0.8 - 1.2 m, 'spicate', flowering part elongate or crowded; **Fl** sessile, erect; **Ov** narrowly ellipsoid, 7 - 12 mm; **Tep** tube narrowly funnel-shaped, 12 - 14 mm, lobes oblong, thin; **Sty** exceeding the tube for 18 - 35 mm; **Sti** trigonous; **Fr** and **Se** unknown.

This species belongs to the *A. scabra* Group within Subgen. *Manfreda*. It differs from other members by its short revolute leaves. The anonymous specimen at B appears to represent the type material of Klotzsch (Verhoek-Williams 1975: 296).

A. rhodacantha Trelease (CUSNH 23: 117, 1920). **T** [neo]: Mexico, Nayarit (Gentry & Gilly 10704 [ARIZ]). – **Lit:** McVaugh (1989). **D:** Mexico (Sonora, Sinaloa, Nayarit, Jalisco, Puebla, Oaxaca); moister mountain slopes, 50 - 1000 m. **I:** Gentry (1982: 581).

[2f] Stem none or 50 - 90 cm; **Ros** truncate, large, 2 - 3 × 3 - 5 m, solitary or caespitose; **L** linear, hard-fibrous, rigid, straight, much thickened and scarcely narrowed at the base, smooth, 140 - 250 × 8 - 15 cm, green to faintly glaucous-green, margins straight to undulate; marginal teeth curved upwards, firm, slender, very sharp, regular, mostly 4 - 8 mm, dark brown, mostly 1 - 3 cm apart; terminal **Sp** conical but frequently with subulate tip, with short open groove above, 1 - 2.5 cm, dark brown; **Inf** 7 - 9 m, 'paniculate', broad, scape short, part-**Inf** large, remote, 35 - 45 per **Inf**; **Fl** 55 - 65 mm (dried and relaxed); **Ov** fusiform, 25 - 35 mm incl. the short neck; **Tep** green, yellowing at anthesis, tube urceolate, 8 - 10 mm, lobes subequal, 16 - 23 mm.

Distinguished from its close relative *A. vivipara* (as *A. angustifolia*) by its very long rigid leaves and large inflorescences with large long-stipitate fruits (Gentry 1982: 582), but the size differences may possibly be due to the moist habitat.

A. rosei Thiede & Eggli (KuaS 50(5): 112, 1999). **T:** Mexico, Nayarit (*Rose* 2178 [US]). – **D:** Mexico (Nayarit); in a deep canyon; only known from the type collection.

Incl. *Polianthes montana* Rose (1903).

[3b1] **L** not narrowed at the base, ± 30 × 0.7 cm,

margins obscurely papillose; **Inf** 1.1 m, 'spicate', flowering part ± 18 cm, with ± 10 flowering nodes; **Ped** (lowest, on faded **Fl**) 6 mm, otherwise 2.5 - 4 mm; **Tep** white, tube curved near the base, 14 - 15 mm, lobes ovate, 2.5 - 3 × 1.5 - 2 mm; **Anth** 4.3 - 4.7 mm; **Fil** (free parts) ± 7 mm.

McVaugh (1989) suggests the possibility that the specimen regarded as type, which much resembles *A. duplicata* (≡ *Polianthes geminiflora*), has erroneously been substituted for the original white-flowering type specimen of *A. rosei* (≡ *Polianthes montana*). The new name was necessary to avoid homonymy with *A. montana* Villarreal 1996.

A. rutteniae Hummelinck (Recueil Trav. Bot. Néerl. 33: 238, 1936). **T** [syn]: Aruba (*Hummelinck* 19a+b [U]). – **D:** Leeward Islands (Aruba); debris of igneous rocks.

[2q] **Ros** ± 0.9 - 1.5 m Ø, suckering; **L** few, narrowly elliptic or lanceolate, straight or very slightly S-curved, acute, tip usually slightly curved upwards, lower face rounded to rather sharply conduplicate, 40 - 70 × 7.5 - 9 cm; marginal teeth slender-aciculate from small tubercles, usually somewhat recurved below the middle of the **L**, 4 - 5 mm (5 - 7 mm below the middle), 9 - 17 per 10 cm; terminal **Sp** acicular, straight, often somewhat flexuous, narrowly and usually shallowly grooved below or beyond the middle, involute or slightly involute towards the base, smooth, 2.2 - 2.8 cm, decurrent; **Inf** usually 2 - 3.5 m, 'paniculate', oblong or obovate, part-**Inf** few, on slightly S-curved ± ascending **Br**, in the upper ¼ - ½ of the **Inf**, forming **Fr** and at the same time freely bulbiferous; **Fl** tube conical, 7.5 mm, lobes 14 - 16 mm; **Fr** shortly oblong, stipitate, not or nearly not beaked, 2.4 - 2.8 × 1.5 - 1.8 cm.

Hummelinck (1938) regarded this species as different from *A. vicina* (as *A. vivipara*) mainly on account of its flowers only.

A. salmiana Otto ex Salm-Dyck (Bonplandia 7: 88, 1859). – **D:** Mexico.

A. salmiana ssp. **crassispina** (Trelease) Gentry (Agaves Cont. North Amer., 609, ill. (pp. 597, 609), 1982). **T:** Mexico, San Luis Potosí (*Trelease* s.n. [MO ?]). – **D:** Mexico (Coahuila, Zacatecas, San Luis Potosí, Guanajuato, Hidalgo, Puebla). **I:** Gentry (1982: 597, 609).

≡ *Agave crassispina* Trelease (1920).

[2b] Differs from ssp. *salmiana*: **Ros** smaller, 0.8 - 1.2 m; **L** fewer and smaller, 60 - 90 × 16 - 25 cm (rarely larger), margins undulate to crenate; marginal teeth firm, with a broad base, mostly 7 - 12 mm, dark brown becoming grey with age, 1 - 3 cm apart.

This ssp. represents the extensive wild populations of *A. salmiana* (Gentry 1982: 610).

A. salmiana ssp. **salmiana** – **Lit:** McVaugh (1989).

D: Mexico (Coahuila, Durango, Zacatecas, San Luis Potosí, Colima, Hidalgo, Puebla); cultivated only. **I:** Gentry (1982: 597, 606, 610).

Incl. *Agave caratas* hort. ex Besaucèle (s.a.); **incl.** *Agave dyckii* hort. ex Besaucèle (s.a.); **incl.** *Agave salmiana* var. *contorta* hort. ex Besaucèle (s.a.); **incl.** *Agave latissima* auct. (s.a.) (*nom. illeg.*, Art. 53.1); **incl.** *Agave jacobiana* Salm-Dyck (1859); **incl.** *Agave tehuacanensis* Karwinsky ex Salm-Dyck (1859) (*nom. illeg.*, Art. 59.1); **incl.** *Agave potatorum* C. Koch (1860) (*nom. illeg.*, Art. 53.1); **incl.** *Agave montezumae* Hort. Belg. ex Jacobi (1864); **incl.** *Agave salmiana* var. *recurvata* Jacobi (1866); **incl.** *Agave atrovirens* W. Neubert (1867) (*nom. illeg.*, Art. 53.1); **incl.** *Agave coarctata* Jacobi (1868); **incl.** *Agave lehmannii* Jacobi (1868); **incl.** *Agave mitriformis* Jacobi (1868) $\equiv$ *Agave salmiana* var. *mitriformis* (Jacobi) Cels (s.a.); **incl.** *Agave cochlearis* Jacobi (1870); **incl.** *Agave quiotifera* Trelease ex Ochoterena (1913); **incl.** *Agave compluviata* Trelease (1914); **incl.** *Agave atrovirens* var. *sigmatophylla* A. Berger (1915); **incl.** *Agave salmiana* var. *angustifolia* A. Berger (1915); **incl.** *Agave whitackeri* hort. ex A. Berger (1915); **incl.** *Agave potatorum* hort. ex A. Berger (1915) (*nom. illeg.*, Art. 53.1).

[2b] Stem short, thick; **Ros** massive, $1.5 - 2 \times \pm 3 - 4$ m, surculose; **L** broadly linear-lanceolate, thickly fleshy, acuminate, tip sigmoidally curved, concave to guttered upwards, $100 - 200 \times 20 - 35$ cm, green to glaucous-greyish, margins of the upper $\frac{1}{2}$ of the **L** often $\pm$ repand, sometimes with small prominences; marginal teeth mostly $5 - 10$ mm (middle of the lamina), brown to greyish-brown, $3 - 5$ cm apart, cusps straight to curved from low broad bases; terminal **Sp** subulate, stout, long, $5 - 10$ cm, dark brown, grooved above for over $\frac{1}{2}$ its length, long decurrent (sometimes to the middle of the lamina) as heavy horny margin; **Inf** $7 - 8$ m, 'paniculate', broad, stout, scape **Bra** large, fleshy, imbricate, part-**Inf** large, several times compound, $15 - 20$ in the upper $\frac{1}{2}$ of the **Inf**; **Fl** $80 - 110$ mm; **Ov** $50 - 60$ mm, green, neck not constricted; **Tep** yellow, tube large, funnel-shaped, $21 - 24$ mm, lobes unequal, $18 - 25$ mm. – *Cytology*: $2n = 120$.

Consisting of many forms cultivated in the pulque industry. It is generally recognizable by its broad, heavy, well-armed green leaves with long-acuminate sigmoid tips and large peduncular bracts subtending broad large pyramidal 'panicles' (Gentry 1982: 605).

A. salmiana var. **ferox** (Koch) Gentry (Agaves Cont. North Amer., 611, ill., 1982). **T** [neo]: Ex cult. La Mortola (*Anonymus* s.n. [K]). – **D:** Mexico (México, Puebla, Oaxaca); mainly cultivated but apparently also spontaneous.

$\equiv$ *Agave ferox* Koch (1860); **incl.** *Agave coelum* hort. ex Besaucèle (s.a.); **incl.** *Agave bonnetiana* Peacock ex Baker (1877).

[2b] Differs from ssp. *salmiana*: **Ros** $1 - 1.5 \times \pm 2 - 3$ m; **L** broadly oblanceolate, outcurving, thick, $70 - 90 \times 23 - 30$ cm, light shiny green, margins crenate with strong prominences; marginal teeth $10 - 14$ mm, on prominent tubercles; **Fl** more slender, $70 - 85$ mm. – *Cytology*: $2n = 120?$.

An easily recognizable variant of uncertain systematic status (Gentry 1982: 611).

A. scabra Ortega (Nov. Pl. Descr. Dec. 2: 13, 1797). **T**: [icono]: Cavanilles, Icones, t. 27, 1803. – **Lit**: McVaugh (1989: fig. 37); Ullrich (1992g). **D:** Mexico (widespread from Durango to Chiapas and Veracruz), Guatemala, Honduras, El Salvador, possibly Nicaragua; rocky slopes in pine-oak forests and ecotones with tropical deciduous forests and Matorral, $200 - 2800$ m, flowers June to February but mainly August to September. **I:** Matuda (1961: 67-68, figs. 8-9, as *Manfreda pringlei* and *M. brachystachys*).

$\equiv$ *Manfreda scabra* (Ortega) McVaugh (1989); **incl.** *Agave brachystachys* Cavanilles (1802) $\equiv$ *Manfreda brachystachys* (Cavanilles) Rose (1903) $\equiv$ *Polianthes brachystachys* (Cavanilles) Shinnars (1966); **incl.** *Agave spicata* De Candolle (1813) (*nom. illeg.*, Art. 53.1); **incl.** *Agave polyanthoides* Schiede ex Schlechtendal & Chamisso (1831); **incl.** *Agave saponaria* Lindley (1838); **incl.** *Agave humilis* M. Roemer (1847); **incl.** *Agave brachystachys* var. *strictior* Jacobi & C. D. Bouché (1865); **incl.** *Agave sessiliflora* Hemsley (1880) $\equiv$ *Manfreda sessiliflora* (Hemsley) Matuda (1961); **incl.** *Agave langlassei* André (1901); **incl.** *Manfreda oliveriana* Rose (1903) $\equiv$ *Agave oliveriana* (Rose) A. Berger (1915) $\equiv$ *Polianthes oliveriana* (Rose) Shinnars (1966).

[3a2] Plants large (for Subgen. *Manfreda*), reproducing vegetatively by buds from the rhizome; **R** fibrous, half-fleshy; rhizome large, oblong, to 7 cm $\varnothing$; **L** $4 - 9$, erect-spreading, broadly or narrowly linear-lanceolate, coriaceous to herbaceous, usually deeply channelled in the lower part, often gently undulate, $(25.5-) 37 - 77 (-91) \times (1-) 1.6 - 4.8 (-6.5)$ cm, green, often glaucous, sometimes spotted with maroon, tip acute, with a short point, veins prominent on the lower face, each vein usually with a single row of papillate cells, margins with a narrow hyaline band, entire to papillate like the veins; remains of **L** bases separating into coarse fibres, $5 - 12$ cm; **Inf** $1 - 2.5$ m, 'spicate', flowering part elongate, lax, $(10-) 23 - 47 (-82)$ cm, with $17 - 46 (-58)$ flowering nodes; **Fl** usually sessile (rarely lower or all **Fl** pedicellate), fairly succulent; **Ov** narrowly ellipsoid, $(8-) 10 - 20$ mm; **Tep** green, frequently with a brownish flush on the lower side, tube narrowly funnel-shaped, slightly curved, not markedly constricted above the **Ov**, $(9-) 13 - 38$ mm, lobes oblong, recurved, $9 - 20 (-23)$ mm, golden-green or brownish-maroon on the upper part, tips swollen and cucullate; **Sty** exceeding the tube by $24 - 37 (-$

74) mm; **Sti** clavate, trigonous; **Fr** oblong, 1.8 - 2.9 × 1.1 - 1.6 cm; **Se** 2 - 4 × 4 - 5 mm.

McVaugh (1989: 234) has replaced the well-established name *Manfreda brachystachys* (based on *Agave brachystachys*, as '*brachystachya*') by the new combination *Manfreda scabra*, based on the earlier name *Agave scabra*. *A. scabra* is the most widely distributed species of Subgen. *Manfreda* and with the exception of the Guatemalan *A. fusca* the only one reaching Central America. It seems to be quite variable, but is characterized by leaves with prominent veins with a row of papillae and margins which are equally papillate, as well as the elongate open inflorescence, semihorizontal flower position, sinuous flower shape, and the tepal tube, which is longer than the ovary and the and lobes (McVaugh 1989).

The pollination biology of this taxon was dealt with by Eguiarte & Búrquez (1987) and Eguiarte (1988).

A. scaposa Gentry (Agaves Cont. North Amer., 303-304, ill., 1982). **T:** Mexico, Oaxaca (Gentry 22472 [US, DES]). – **D:** Mexico (Puebla, Oaxaca). **I:** Gentry (1982: 304).

[2a] **Stem** short; **Ros** large, 1.5 - 1.7 m, broad, solitary; **L** 60 - 70, broadly lanceolate, outcurving to spreading, coriaceous, heavily succulent, slightly narrowed above the thick base, upper face almost plane to concave, 100 - 115 × 20 - 25 cm, light green to yellowish-green, frequently glaucous, margins straight to crenate; marginal teeth numerous, dark brown, close-set, sometimes on small prominences, confluent or 1 - 2 cm apart, cusps 3 - 8 mm from broad flattened bases, with few smaller intermittent teeth placed at random; terminal **Sp** subulate, base conical, 2.5 - 6 cm, dark brown, decurrent to ¼ - ½ of the lamina; **Inf** 7 - 9 m, 'paniculate', scape 5 - 7 m, part-**Inf** 25 - 40 in the upper ¼ of the **Inf**; **Fl** and **Fr** unknown.

A. schottii Engelm (Trans. Acad. Sci. St. Louis 3: 305-306, 1875). **T:** USA, Arizona (*Schott* s.n. [US, MO]). – **Lit:** Turner & al. (1995). **D:** USA (Arizona, New Mexico), Mexico (Sonora).

A. schottii var. *schottii* – **D:** USA (Arizona, New Mexico), Mexico (Sonora). **I:** Gentry (1982: 196); KuaS 43(12): centre page pullout 1992/35. **Fig. VI.e**

Incl. *Agave geminiflora* var. *sonorae* Torrey (1859) ≡ *Agave sonorae* (Torrey) Mearns (1907); **incl.** *Agave schottii* var. *serrulata* Mulford (1896); **incl.** *Agave mulfordiana* Trelease (1920); **incl.** *Agave schottii* var. *atracha* Trelease (1920).

[1e] **Ros** small, densely caespitose; **L** narrowly linear, straight, incurved, or falcate, pliable, widest at the base, deeply convex below, flat or somewhat convex above, smooth, 25 - 40 (-50) × 0.7 - 1.2 cm, yellowish-green to green, margins with a narrow

border and sparse brittle threads; terminal **Sp** delicate, rather weak and brittle, 8 - 12 mm, greyish; **Inf** 1.8 - 2.5 m, 'spicate', slender, frequently crooked, flowering in the upper ¼ - ½, part-**Inf** with 1 - 3 **Fl**; **Ped** stout, 3 - 5 mm; **Fl** 30 - 40 mm; **Ov** 10 - 14 mm incl. the 4 - 6 mm long neck, greenish-yellow; **Tep** yellow, tube deeply funnel-shaped, 9 - 14 mm, lobes unequal, 10 - 16 mm. – *Cytology:* 2n = 60.

The flowers of *A. schottii* have a long tubular appearance due to the slender tube and the long narrow neck of the ovary. The taxon is easily confused with narrow-leaved forms of *A. felgeri*, but the latter has a short flower tube (Gentry 1982: 207).

A. schottii var. *treleasei* (Toumey) Kearney & Peebles (J. Washington Acad. Sci. 29: 474, 1939). **T:** USA, Arizona (*Toumey* s.n. [Herb. Toumey [not located]]). – **D:** USA (Arizona). **I:** Gentry (1982: 207).

≡ *Agave treleasei* Toumey (1901).

[1e] Differs from var. *schottii*: **L** larger, thicker and wider (1.5 - 2.5 cm), deep green.

A doubtful variant in need of better study (Gentry 1982: 207), which occurs sympatrically with var. *schottii* (Gentry 1972: 77). It appears to be based on scattered aberrant specimens. At the type locality, only few plants were found in 1940 (Benson & Darrow 1981: 68) and none later in the 80ies (Reichenbacher 1985: 103). Hodgson (1999), however, gives new distributional records and an altitudinal range of 600 - 1500 m in desert scrub.

A. sebastiana Greene (Bull. Calif. Acad. Sci. 1: 214, 1885). **T:** Mexico, Baja California (*Greene* s.n. [CAS]). – **Lit:** Turner & al. (1995). **D:** Mexico (Isla San Benito, Isla Cedros and Isla Natividad off the coast of Baja California). **I:** Gentry (1982: 645-646).

≡ *Agave shawii* var. *sebastiana* (Trelease) Gentry (1949); **incl.** *Agave disjuncta* Trelease (1912).

[2e] **Ros** elongate, medium-sized to rather large, 0.6 - 1.2 m Ø; **L** broadly linear to ovate, shortly acuminate, thick and rigid, sometimes slightly narrowed towards the base, rounded below, plane to slightly hollowed above, generally 25 - 45 × 8 - 24 cm, light yellowish- to greyish-green, with imprints left by the central bud, margins usually horny, dark brown; marginal teeth frequently down-flexed, slender, larger teeth (middle of the lamina) 5 - 10 mm, reddish-brown, 1 - 2 cm apart, or smaller and more numerous; terminal **Sp** stout, variously grooved above, 2 - 3 cm (rarely shorter), black to somewhat grey; **Inf** 2 - 3 m, 'paniculate', short, widely spreading, rounded to nearly flat, scape stout, with deltoid scarious appressed peduncular **Bra**, part-**Inf** large, 8 - 12 in the upper ¼ of the **Inf**; **Fl** 70 - 90 mm; **Ov** 35 - 55 mm; **Tep** green in bud, opening yellow, tube broadly funnel-shaped, 14 - 20 mm, lobes 16 - 25 mm.

Closely related to *A. shawii*, but differing significantly in the pale green somewhat glaucous leaves with more slender teeth, the smaller more remote and scarious peduncular bracts and the broader flatter inflorescences (Gentry 1982: 646).

A. seemanniana Jacobi (Abh. Schles. Ges. Vaterl. Cult., Abth. Naturwiss. 1868: 154, 1868). **T** [neo]: Honduras (Gentry 20684 [US, DES, MEXU]). – **Lit**: Ullrich (1992c). **D**: Mexico (Oaxaca, Chiapas), Guatemala, Honduras, N Nicaragua; dry rocky slopes, 400 - 2200 m. **I**: Gentry (1982: 496-499).

≡ *Agave scolymus* var. *seemanniana* (Jacobi) A. Terracciano (1885); **incl.** *Agave seemannii* hort. ex Besaucèle (s.a.) (*nom. inval.*, Art. 61.1); **incl.** *Agave caroli-schmidtii* A. Berger (1915); **incl.** *Agave guatemalensis* A. Berger (1915); **incl.** *Agave seemanniana* var. *perscabra* Trelease (1915); **incl.** *Agave tortispina* Trelease (1915); **incl.** *Agave pygmaea* Gentry (1982) ≡ *Agave seemanniana* ssp. *pygmaea* (Gentry) B. Ullrich (1992); **incl.** *Agave pygmaea* Gentry (1982) (*nom. inval.*, Art. 61.1).

[2k] **Ros** compact, small to medium-sized, solitary; **L** ovate to broadly lanceolate or spatulate, thickly succulent, thickened and strongly narrowed at the base, plane to hollow-upcurved, generally 30 - 50 × 12 - 20 cm, light glaucous to yellowish-green, margins undulate to sharply crenate; marginal teeth mostly straight or some curved, deltoid, 5 - 10 mm, rarely much larger, dark to greyish-brown, 1 - 3 cm apart, usually on conspicuous marginal prominences; terminal **Sp** subulate, very broad at the base, broadly grooved above, 2 - 4 cm, dark brown to greyish, conspicuously decurrent as a sharp ridge to the upper marginal teeth; **Inf** 3 - 4 m, 'paniculate', ovate in outline, rather open, scape short, part-**Inf** spreading, 18 - 30 in the upper ½ of the **Inf**; **Fl** slender, 50 - 70 mm; **Ov** slender, fusiform to cylindrical, 25 - 38 mm, green, neck lightly furrowed; **Tep** yellow, tube broadly funnel-shaped, 7 - 11 mm, lobes slightly unequal, 13 - 24 mm.

This taxon exhibits considerable variation in leaf characters. Within its geographical range, it is recognizable by the small compact rosettes with broad plane leaves markedly narrowed at the base (Gentry 1982: 497-498).

A. shaferi Trelease (Mem. Nation. Acad. Sci. 11: 35, t. 57, 1913). **T**: Cuba (*Shafer* 3800 [MO?]). – **Lit**: León (1946). **D**: E Cuba.

[2l] **Ros** unknown; **L** elongate-lanceolate, rather gradually pointed, ± 75 × 10 cm, green, margins between the marginal teeth slightly concave; marginal teeth slightly curved upwards or downwards, triangular from lenticular bases, ± 1 mm, brown, 1 - 2 cm apart; terminal **Sp** conically subulate, unguiculate recurved, openly V-grooved to the middle, smooth, 1 cm, brown, dull, not decurrent; **Inf** 'paniculate', 6 - 7 m; **Fl** 50 mm; **Ov** fusiform, 25 - 30

mm; **Tep** bright yellow, tube conical, 5 - 6 mm, lobes 14 mm; **Fr** unknown.

A. shawii Engelm (Trans. Acad. Sci. St. Louis 3: 314-316, 370, 1875). **T**: USA, California (*Hitchcock* s.n. [MO]). – **Lit**: Turner & al. (1995). **D**: USA (S California), Mexico (Baja California).

A. shawii ssp. *goldmaniana* (Trelease) Gentry (Occas. Pap. Calif. Acad. Sci. 130: 93, 1978). **T**: Mexico, Baja California (*Nelson & Goldman* 7151 [US]). – **D**: Mexico (C Baja California); 5 - 700 m. **I**: Gentry (1982: 636, 640); KuaS 41(9): centre page pullout 1990/26.

≡ *Agave goldmaniana* Trelease (1912).

[2e] Differs from ssp. *shawii*: **Ros** medium to large; **L** lanceolate rather than linear-ovate, more acuminate, longer, 40 - 70 × 10 - 18 cm. – *Cytology*: 2n = 60.

Representing the ecotype of the more arid interior habitats.

A. shawii ssp. *shawii* – **D**: USA (S California), Mexico (Baja California); coastal in sagebrush communities. **I**: Gentry (1982: 636, 640).

Incl. *Agave orcuttiana* Trelease (1912); **incl.** *Agave pachyacantha* Trelease (1912).

[2e] Stem short to long (2 m), erect to decumbent, frequently branching from **L** axils; **Ros** compact, small to medium-sized, solitary or caespitose; **L** ovate to linear-ovate, thick, fleshy, rigid, shortly acuminate, plane to slightly hollowed above, slightly asperous, 20 - 50 × 8 - 20 cm, glossy light to dark green; marginal teeth very variable in size and shape, straight or variously curved, 5 - 20 mm (middle of the lamina), decreasing in size below, reddish to dark brown or dark grey, usually 1 - 2 cm apart or rarely confluent; terminal **Sp** acicular, straight or sinuous, broad at the base, openly grooved above, 2 - 4 cm, dark reddish-brown to grey, decurrent as horny margin for 8 - 10 cm or along the entire **L**; **Inf** 2 - 4 m, 'paniculate', scape with closely imbricate large purple succulent **Bra** closely investing the part-**Inf**, these dense, horizontal to ascending, commonly 8 - 14 per **Inf**; **Fl** 75 - 100 mm; **Ov** 35 - 50 mm, greenish; **Tep** frequently purplish or red in bud, opening yellow or reddish, tube amply funnel-shaped, 12 - 16 mm, lobes unequal, 25 - 38 mm. – *Cytology*: 2n = 60.

A. shrevei Gentry (Publ. Carnegie Inst. Washington 527: 95, 1942). **T**: Mexico, Chihuahua (Gentry 2028 [CAS]). – **D**: NW Mexico.

A. shrevei ssp. *magna* Gentry (Agaves Cont. North Amer., 451-453, ill., 1982). **T**: Mexico, Chihuahua (Gentry & Bye 23360 [US, DES, MEXU]). – **D**: Mexico (Sonora, Chihuahua, Sinaloa).

[2g] Differs from ssp. *shrevei*: **Ros** 1.4 - 1.7 × up to 2.5 m, mostly solitary; **L** outcurving, guttered,

thickened and broadened towards the base, finely asperous, mature **L** mostly 120 - 150 × 15 - 25 cm, margins remotely crenate; marginal teeth along most of the lamina, 6 - 10 (-15) mm, mostly 3 - 5 cm apart, on pronounced prominences, frequently with small intermittent teeth; terminal **Sp** 3.5 - 6 cm; **Inf** 6 - 7 m, part-**Inf** 20 - 30 per **Inf**.

The main difference from ssp. *shrevei* is the larger size (Gentry 1982: 451).

A. shrevei ssp. *matapensis* Gentry (US Dept. Agric. Handb. 399: 115-117, ill., 1972). **T**: Mexico, Sonora (Gentry 11607 [US 2540344]). – **D**: Mexico (Sonora). **I**: Gentry (1982: 423, 455).

[2g] Differs from ssp. *shrevei*: **Ros** suckering late and sparingly; larger marginal teeth in the middle of the lamina down-flexed; **Fl** smaller; **Ov** 22 - 40 mm incl. the short unstricted neck, tube 15 - 20 mm, outer lobes 11 - 16 mm.

A. shrevei ssp. *shrevei* – **D**: Mexico (Sonora, Chihuahua); open rocky limestone slopes in oak woodland and pine-oak forests, 930 - 1850 m. **I**: Gentry (1982: 423, 448-449). **Fig. VI.f**

[2g] **Ros** small to medium-sized, suckering with maturity; **L** ovate, short-acuminate, 20 - 35 × 8 - 10 cm, or lanceolate, acuminate and 50 - 60 × 12 - 18 cm, generally narrowed above the base, firm, thick, straight or outcurving near the tip, light grey, glaucous; marginal teeth variable, straight or flexed up- or downwards, larger teeth 5 - 10 mm (middle of the lamina), dark brown to grey, on small to pronounced prominences; terminal **Sp** acicular, stout, with a narrow or open groove from the base to above the middle, mostly 2.5 - 5 cm, brown; **Inf** 2.5 - 5 m, 'paniculate', part-**Inf** ascending, small, 8 - 16 in the upper 1/3 of the **Inf**; **Fl** persisting erect, slender, 60 - 70 mm; **Ov** 25 - 35 mm incl. the constricted neck; **Tep** light green to pale yellow, tips red to purplish, tube cylindrical or urceolate, 18 - 23 mm, lobes unequal, outer 10 - 12 mm.

Well distinguished by its broad light glaucous-grey leaves with margins bearing prominences with well-developed brown teeth, and the leathery perianth with a deep tube (Gentry 1982: 448).

A. sileri (Verhoek-Williams) Thiede & Eggli (KuaS 50(5): 111, 1999). **T**: USA, Texas (*Siler* s.n. [BH 69-518B]). – **Lit**: Verhoek-Williams (1978: with ill.). **D**: USA (S Texas), Mexico (Tamaulipas); open areas on clay soil, flowers April to July.

≡ *Manfreda sileri* Verhoek-Williams (1978); **incl.** *Manfreda variegata* var. *sileri* Verhoek-Williams (1975) (*nom. inval.*, Art. 29.1).

[3a1] Plants large (for Subgen. *Manfreda*), reproducing vegetatively by buds from the **Ax** of the **L** of the parent **Ros** or by buds from the rhizome, rhizome globose; **R** fleshy; **L** spreading, ovate-lanceolate, channelled and undulate or flat, long-attenuate

towards the tip, tip acute with a medium-sized point, succulent, brittle, (14-) 25 - 39 × 2.2 - 4.8 cm, light green, spotted, glaucous except over the spots, spots darker green or brown, large, round to elliptic, usually confluent, margins with a cartilaginous band, minutely denticulate, teeth of several sizes, irregularly spaced, often retrorse; remains of **L** bases membranous, not separating into fibres; **Inf** 2.4 - 2.6 m, 'spicate', flowering part dense, 28 - 39.5 cm, with 27 - 46 (-81) **Fl**; **Fl** sessile, nearly erect; **Ov** ellipsoid, (10-) 12 - 20 mm; **Tep** glaucous-green on the outer face, golden-green on the inner face, tube broadly campanulately funnel-shaped, (7-) 9 - 15 (-22) mm, lobes revolute, oblong, (7-) 10 - 21 mm; **Sty** straight, exerted for 44 - 66 (-95) mm; **Sti** clavate-capitate, trigonous; **Fr** oblong, 2.3 - 3.1 × 1.6 - 1.9 cm; **Se** 5 - 6 × 5 mm.

According to the protologue (Verhoek-Williams 1978) closely related to *A. variegata*, but different by its larger size, spreading and only shallowly channelled glaucous leaves spotted with large brown markings.

A. singuliflora (S. Watson) A. Berger (Agaven, 31, 1915). **T** [lecto]: Mexico, Chihuahua (*Pringle* 1142 [GH, US]). – **D**: Mexico (Chihuahua, Durango, Zacatecas); cool slopes in the pine-oak forest region, 1675 - 2590 m, flowers late June to early October.

≡ *Bravoa singuliflora* S. Watson (1887) ≡ *Manfreda singuliflora* (S. Watson) Rose (1903) ≡ *Polianthes singuliflora* (S. Watson) Shinnars (1966).

[3a2?] Plants medium-sized (for Subgen. *Manfreda*); **R** fleshy; rhizome small, 1.7 × 1.2 cm; **L** 2 - 8 (-14), sprawling, linear-lanceolate, channelled, semisucculent, tip acute, with a medium-sized point, 17 - 34 × 0.4 - 1.3 (-1.5) cm, glaucous, occasionally red-speckled at the base, margins bordered by a narrow hyaline band; remains of the **L** bases 4 - 8 cm; **Inf** 45 - 116 cm, 'spicate', flowering part open, 5.2 - 28 (-46) cm, with 5 - 18 (-26) usually sessile horizontal **Fl** (lower or rarely all **Fl** pedicellate); **Ov** nearly erect, at a narrow angle to the **Inf** axis, ellipsoid, 4 - 10 mm; **Tep** green or green with a brown-maroon streak on the lower parts, tube narrowly funnel-shaped, arched so that the mouth faces downwards, 15 - 23 (-27) mm, lobes oblong, revolute, 7 - 12 (-18) mm; **Sty** exceeding the tube for 5 - 12 (-15) mm, white; **Sti** clavate, deeply fissured; **Fr** globose to oblong, 1.5 - 2.3 × 1.3 - 1.7 cm; **Se** 4 × 3 mm.

Differing from all other members in the *Manfreda* Group by the extreme curvature of the perianth (Verhoek-Williams 1975: 263).

A. sisalana Perrine (Trop. Pl., 8, 9, 16, 47, 60, 86, 1838). **T** [neo]: Mexico, Chiapas (Gentry 16434 [US, DES]). – **D**: Cultivated only; nearly worldwide in tropical regions. **I**: Gentry (1982: 621).

≡ *Agave rigida* var. *sisalana* (Perrine) Engelmann (1875); **incl.** *Agave houlettii* Jacobi (1866); **incl.**

Agave houlletiana Cels ex Jacobi (1866); **incl.** *Agave laevis* hort. ex Baker (1892); **incl.** *Agave sisalana* var. *armata* Trelease (1913) $\equiv$ *Agave sisalana* fa. *armata* (Trelease) hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave sisalana* fa. *marginata* Medina (1955); **incl.** *Agave sisalana* fa. *medio-picta* Medina (1955).

[2f] Stem 0.4 - 1 m; **Ros** 1.5 - 2 m, suckering with elongate rhizomes; **L** ensiform, fleshy, 90 - 130 $\times$ 9 - 12 cm, green, somewhat slightly zoned in youth; young **L** with few minute marginal teeth, mature **L** usually without marginal teeth; terminal **Sp** subulate, shortly shallowly grooved above, 2 - 2.5 cm, dark brown, somewhat lustrous, not decurrent; **Inf** 5 - 6 m, 'paniculate', ellipsoid, scape short, part-**Inf** 10 - 15 (-25) in the upper $\frac{1}{2}$ of the **Inf**, bulbiliferous after flowering; **Fl** 55 - 65 mm, unpleasantly scented; **Ov** shortly fusiform, 20 - 25 mm, nearly neckless; **Tep** greenish-yellow, tube broadly urceolate, 15 - 18 mm, lobes equal, 17 - 18 mm. - *Cytology*: $2n = \pm 138, 149, 150$.

Easily recognizable by its green unarmed mature leaves with short dark brown conical to subulate non-decurrent terminal spine. The taxon appears to represent a sexually sterile clone that is widely cultivated in fibre plantations and could be of hybrid origin within the *A. vivipara*-complex (as *A. angustifolia*) (Gentry 1982: 628-629). Ullrich (1990d) consequently removed it from Gentry's Group *Sisalanae* and placed it in Group *Viviparae* (as *Rigidiae*).

A. sobolifera Salm-Dyck (Hort. Dyck., 307, 1834). - **Lit**: Trelease (1913); Adams (1972); Proctor (1984: with ill.). **D**: Cayman Islands, Jamaica; dry rocky well-drained hillsides.

Incl. *Agave morrisii* Kent (s.a.) (*nom. illeg.*, Art. 53.1); **incl.** *Agave americana* Lamarck (1783) (*nom. illeg.*, Art. 53.1); **incl.** *Agave ornata* Jacobi (1865); **incl.** *Agave morrisii* Baker (1887); **incl.** *Agave laetevirens* hort. ex A. Berger (1915).

[2l] **Ros** solitary; **L** variously lanceolate, massive, curved, gradually acute or somewhat subacuminate, often deeply and conduplicately or undulately concave, $\pm 125 - 200 \times 15 - 24$ cm, 9 cm thick near the base, rather light green, somewhat glossy, margins $\pm$ concave; marginal teeth curved or reflexed-triangular (rarely straight), 1 - 4 mm, glossy dark brown, 5 - 15 mm apart, often hardened on the tops of green prominences of the margin; terminal **Sp** conical, nearly straight, slightly flattened, grooved or slightly involutely channelled below the middle when mature, smooth, somewhat glossy, 1.5 - 2.5 cm, reddish-brown, not decurrent; **Inf** 5 - 9 m, 'paniculate', oblong, part-**Inf** on rather short spreading **Br**, above the middle of the **Inf**, freely bulbiliferous; **Fl** ± 50 mm; **Ov** narrowly fusiform, 15 - 20 (-25) mm, from slightly shorter to longer than the **Tep**; **Tep** 12 - 19 mm, golden-yellow to light orange, tube open, 5 - 7 mm, lobes ± 20 mm; **Fr** nar-

rowly oblong, turbinate narrowed at the base, shortly beaked at the tip, 4.5 - 5 $\times$ 1.3 - 2 cm.

See Trelease (1913: 33) on the difficult interpretation of this name.

A. sobria Brandegees (Proc. Calif. Acad. Sci., ser. 2, 2: 207, 1889). **T**: Mexico, Baja California (*Brandegee* 2 [UC, DS]). - **Lit**: Turner & al. (1995). **D**: Mexico (Baja California Sur).

A. sobria ssp. *frailensis* Gentry (Occas. Pap. Calif. Acad. Sci. 130: 54-56, ill., 1978). **T**: Mexico, Baja California (*Gentry & Cech* 11264 [US]). - **D**: Mexico (Baja California Sur: Cape region). **I**: Gentry (1982: 356, 401-402).

[2h] Differs from ssp. *sobria*: **Ros** compact, small, sparingly caespitose; **L** more numerous, broadly lanceolate, mostly 20 - 35 $\times$ 6 - 8 cm, glaucous-green to bluish-glaucous, margins with pronounced prominences; marginal teeth numerous, smaller, mostly 6 - 10 mm, chestnut-brown to greying, closely spaced; terminal **Sp** frequently sinuous or contorted, 3 - 4 cm; **Inf** with 10 - 15 part-**Inf**; **Fl** slender, 45 - 63 mm; **Ov** cylindrical, 25 - 40 mm, lobes 4 - 6 mm wide.

A. sobria ssp. *roseana* (Trelease) Gentry (Occas. Pap. Calif. Acad. Sci. 130: 54, 1978). **T**: Mexico, Baja California (*Rose* 16854 [US]). - **D**: Mexico (Baja California Sur: Espíritu Santo Island and adjacent mainland). **I**: Gentry (1982: 356, 401-402); KuaS 45(9): centre page pullout 1994/26.

$\equiv$ *Agave roseana* Trelease (1912) $\equiv$ *Agave sobria* var. *roseana* (Trelease) I. M. Johnston (1924).

[2h] Differs from ssp. *sobria*: **Ros** openly spreading; **L** broadly lanceolate, frequently twisted, acuminate, 35 - 50 $\times$ 7 - 10 cm, yellow-green, margins with prominent prominences, tubercles 1 - 1.5 mm; marginal teeth flexuous, few, large, larger teeth 10 - 25 mm, remote; terminal **Sp** sinuous to contorted, 5 - 7 cm; **Inf** with 8 - 12 part-**Inf**; **Fl** 45 - 65 mm, lobes 4 - 5 mm wide.

A. sobria ssp. *sobria* - **D**: Mexico (Baja California Sur); widely scattered but common in the Sierra de la Giganta, sea-level to 1070 m. **I**: Gentry (1982: 356, 397-398).

Incl. *Agave affinis* Trelease (1912); **incl.** *Agave carminis* Trelease (1912); **incl.** *Agave slevinii* I. M. Johnston (1924).

[2h] Stem short or none; **Ros** open, 0.5 - 1.5 m $\varnothing$, usually caespitose; **L** few, linear to lanceolate, straight to curved, long-acuminate, thick and convex below towards the base, plane to somewhat concave above, 45 - 80 $\times$ 5 - 10 cm, bright glaucous-grey, frequently cross-zoned, margins undulate to tuberculate; marginal teeth variously curved or straight, flattened, base broad, mostly 5 - 10 mm, base grey, reddish towards tips, mostly 3 - 4 cm apart; terminal **Sp** acicular, narrowly grooved above, mostly 3 - 6 cm; **Inf** 2.5 - 4 m, 'paniculate', slender,

part-**Inf** compact, nearly globose, 12 - 20 per **Inf**; **Fl** slender, 45 - 55 mm; **Ov** tapering at the base, 25 - 35 mm, neck short, scarcely constricted; **Tep** pale yellow, tube broadly funnel-shaped, 3 - 4 mm, lobes $\pm$ equal, 17 - 22 $\times$ 3 - 4 mm. – *Cytology*: 2n = 60.

Distinguished by the slender flowers with long narrow tepals as well as by the very light-glaucous long-lanceolate leaves with remote marginal teeth (Gentry 1982: 396).

A. spicata Cavanilles (Anales Ci. Nat. 5(15): 261, 1802). **T**: Ex cult. Madrid (*Anonymus* s.n. [MA]). – **Lit**: Ullrich (1995); Ullrich (1996). **D**: Not known from the wild; possibly Mexico (Hidalgo: Real del Monte?). **I**: Gentry (1982: 86, as *A. yuccaefolia*).

$\equiv$ *Agave yuccaefolia* var. *spicata* (Cavanilles) A. Terracciano (1885) (*incorrect name*, Art. 11); **incl.** *Agave yuccaefolia* var. *viridis* hort. ex Besaucèle (s.a.); **incl.** *Agave yuccaefolia* F. Delaroche (1811); **incl.** *Agave spicata* Gussone (1825) (*nom. illeg.*, Art. 53.1); **incl.** *Agave hookeri* C. Koch (1865); **incl.** *Agave cohniana* Jacobi (1866); **incl.** *Agave yuccaefolia* var. *caespitosa* A. Terracciano (1885).

[1b] Stem short or none; **Ros** open, small to medium-sized, suckering; **L** rather few, linear, recurving with maturity, soft, pliable, scarcely succulent, weakly and finely fibrous, convex below, concave above, 50 - 65 $\times$ 3 - 3.5 cm, mostly green with pale midstripe, sometimes reddish- or purple-spotted, margins finely serrulate with unequal denticles; terminal **Sp** conical to subulate, 3 - 8 mm, brown; **Inf** 2 - 3 m, 'spicate', slender, arching, part-**Inf** mostly with geminate **Fl**; **Ped** short; **Fl** 40 mm, unpleasantly scented; **Ov** 16 - 18 mm, neck short; **Tep** greenish-yellow, tube narrowly cylindrical, $\pm$ 8 mm, lobes 15 - 16 mm.

Ullrich (l.c.) replaced *A. yuccaefolia* (the name used by Gentry (1982: 85-86) for this plant) by the older name *A. spicata*. It is a very distinct species without close relatives within Group *Serrulatae* (as *Amolae*), which lead Ullrich (l.c.) to place it in a section of its own (Sect. *Yuccaefoliae* (A. Terracciano) Ullrich).

A. stictata Thiede & Eggli (KuaS 50(5): 111, 1999). **T**: [icono]: Martius, Ausw. merkw. Pfl., t. 13, 1831. – **D**: Mexico (México, Guerrero); rocky slopes and moist shady areas in oak woods, 1370 - 1830 m, flowers mid-July to mid-September. **I**: Piña Luján (1986: 17, as *Manfreda maculata*).

Incl. *Polianthes maculata* Martius (1831) $\equiv$ *Manfreda maculata* (Martius) Rose (1903).

[3a2] Plants of small to medium size (for Subgen. *Manfreda*); **R** half-fleshy to fibrous, often extending horizontally from the base of the rhizome; rhizome 1.5 - 2.5 (-3.5) $\times$ 0.7 - 1.5 cm; **Ros** base surrounded by fibrous **L** bases forming an ovoid bulb-like underground portion of 3.5 - 5.5 $\times$ 0.8 - 1.3 cm; **L** 2 - 6, narrowly to broadly (ob-) lanceo-

late, narrowed towards the base, tip acute and short-pointed, only slightly channelled, coriaceous, undulate, 9 - 26 $\times$ (0.8-) 1 - 3.5 (-4.5) cm, lower face paler green, often with large elliptic dark green or brown spots scattered densely over both faces, densely pubescent on both faces with straight simple **Ha** 0.6 - 0.8 mm long, margins with a narrow hyaline band, entire; remains of **L** bases membranous, 1.8 - 4 (-4.5) cm; **Inf** 21 - 96 cm, 'spicate', flowering part lax, 7 - 25.5 cm, with 4 - 22 usually sessile (rarely shortly pedicellate) **Fl**; **Ov** ellipsoid, 5 - 12 mm; **Tep** tube straight, not constricted above the **Ov**, 10 - 19 $\times$ $\pm$ 4 (middle of the tube) mm, lobes oblong, revolute, 6 - 11 mm; **Sty** exceeding the tube for 9 - 17 (-19) mm; **Sti** clavate, trigonous; **Fr** subglobose to oblong, 1.2 - 1.6 $\times$ 0.8 - 1.1 cm; **Se** 3 - 4 $\times$ 2 - 3 mm.

Differentiated from most other species of Subgen. *Manfreda* by the bulbous portion formed by the leaf bases, and by the pubescent leaves narrowed into a petiolar portion; pubescent leaves are otherwise only found in *A. pubescens* (Verhoek-Williams 1975: 303-304). When transferring *Manfreda maculata* to the genus *Agave*, a new epithet was necessary because of the earlier name *A. maculata* Regel 1856.

A. striata Zuccarini (Flora 15: 2(Beiblatt 2): 98, 1832). **T**: K [neo]. – **D**: Mexico (Coahuila, Nuevo León, Tamaulipas, Durango, Zacatecas, San Luis Potosí, Querétaro, Hidalgo); limited to drier valleys and plains with annual rainfall < 500 mm.

A. striata ssp. *falcata* (Engelmann) Gentry (Agaves Cont. North Amer., 245, ill. (pp. 236, 246-247), 1982). **T** [lecto]: Mexico, Coahuila (*Wislizenus* 312 [MO]). – **D**: Mexico (Coahuila, Nuevo León, Durango, Zacatecas, San Luis Potosí); sandy coarse rocky soils on bajadas, slopes and plains in shrub and succulent deserts, 1000 - 2000 m.

$\equiv$ *Agave falcata* Engelmann (1875); **incl.** *Agave californica* Jacobi (1868) $\equiv$ *Agave striata* var. *californica* (Jacobi) A. Terracciano (1885); **incl.** *Agave paucifolia* Todaro (1877); **incl.** *Agave californica* Baker (1877) (*nom. illeg.*, Art. 53.1); **incl.** *Agave falcata* var. *espadina* A. Berger (1915); **incl.** *Agave falcata* var. *microcarpa* A. Berger (1915).

[1a] Differs from ssp. *striata*: **L** fewer, straight to falcate, rigid, more xerophytic, broader, 30 - 60 $\times$ 0.8 - 1.8 cm, margins serrulate.

Intergrades gradually into ssp. *striata* (Gentry 1982: 245).

A. striata ssp. *striata* – **D**: Mexico (Coahuila, Nuevo León, Tamaulipas, Durango, Zacatecas, San Luis Potosí, Querétaro, Hidalgo, Puebla); drier valleys and plains. **I**: Gentry (1982: 236, 243-244). **Fig. VI.b, VI.c**

Incl. *Agave recurva* Zuccarini (1845) $\equiv$ *Agave striata* var. *recurva* (Zuccarini) Baker (1877); **incl.**

Agave ensiformis hort. ex Baker (1877); **incl.** *Agave striata* var. *mesae* A. Berger (1915).

[1a] Stem short; **Ros** compact, 0.5 - 1 × 0.5 - 1.2 m, often forming large dense clusters 2 - 3 m broad by axillary branching; **L** many, linear, straight to arching, thick, rather turgid, convex above, smooth or scabrous along the keels and below, mostly 25 - 60 × 0.5 - 1 cm, pale green to red or purplish, brownish at the tip below the terminal **Sp**, striate, margins cartilaginous, ≤ 1 mm wide, pale yellow, scabrous or minutely serrulate; terminal **Sp** subulate, very pungent, 1 - 5 cm, reddish-brown to dark grey; **Inf** erect, 1.5 - 2.5 m, 'spicate', rather laxly flowered above the long scape, part-**Inf** with mostly geminate **Fl**; **Fl** tubular, 30 - 40 mm; **Ov** rounded-triangular, grooved, 12 - 15 mm, neckless; **Tep** greenish-yellow or red to purple, tube 14 - 20 mm, lobes about equal, 5 - 7 mm. – *Cytology*: 2n = 60.

The taxon is represented by extensive populations varying in growth habit, leaf forms, and to a lesser extent in flower structure. *A. echinoides* Jacobi (inflorescence unknown) is a doubtful synonym either of this species or of *A. stricta* (Gentry 1982: 245).

A. stricta Salm-Dyck (Bonplandia 7(7): 94-95, 1859). **T** [neo]: Mexico, Puebla (Gentry & al. 20226 [US, DES, MEXU]). – **Lit**: Ullrich (1990c). **D**: Mexico (Puebla [esp. Tehuacán valley], N Oaxaca). **I**: Gentry (1982: 236, 248). **Fig. VI.a**

≡ *Agave striata* var. *stricta* (Salm-Dyck) Baker (1877) ≡ *Agave striata* ssp. *stricta* (Salm-Dyck) B. Ullrich (1990); **incl.** *Agave hystrix* Hort. Belg. ex Jacobi (1870).

[1a] Stem elongate and branching, decumbent with age, 1 - 2 m; **Ros** often densely caespitose; **L** very numerous, long-lanceolate, linear, upcurved to straight, rigid, widest near the base, somewhat keeled above and below, 25 - 50 × 0.8 - 1 cm, green, striate, margins thin, pale yellow, cartilaginous, scabrous-serrulate; terminal **Sp** acicular, 1 - 2 cm, grey, decurrent along the margin, at the base bordered with the brownish **L** tip; **Inf** 1.5 - 2.5 m, 'spicate', straight or crooked, part-**Inf** with geminate **Fl**; **Fl** ascending to outcurved, 25 - 30 mm; **Ov** 8 - 11 mm, neckless; **Tep** red to purplish, tube funnel-shaped, 8 - 10 mm, lobes equal, 8 - 10 mm.

Distinguished from the vegetatively very similar *A. striata* by its short flower tube, equalled or exceeded in length by the tepals. Ullrich (l.c.) emphasizes vegetative similarities and suggests sub-specific rank under *A. striata*, but he is not followed by Zamudio Ruiz & Sánchez Martínez (1995).

A. stringens Trelease (CUSNH 23: 114, 1920). **T**: Mexico, Jalisco (*Trelease* s.n. [MO]). – **Lit**: McVaugh (1989). **D**: Mexico (Jalisco: Río Blanco near Guadalajara).

[2f] **Ros** unknown; **L** concave, thin and recurving, ≥ 60 × 1 - 2 cm, very glaucous, margins carti-

laginous, nearly straight; marginal teeth curved, very sharp and slender, 1 - 2 mm, red or brown, scarcely 5 mm apart; terminal **Sp** conical, ± 8 × 2 mm, dark; **Inf** unknown.

Hardly known and in need of recollection.

A. subsimplex Trelease (Annual Rep. Missouri Bot. Gard. 22: 60, 1912). **T**: Mexico, Sonora (*Rose* 16811 [US]). – **Lit**: Turner & al. (1995). **D**: Mexico (Sonora); strictly coastal. **I**: Gentry (1982: 356, 405-406).

[2h] **Ros** low-spreading, small, 20 - 35 × 50 - 70 cm Ø, solitary or caespitose; **L** variable, lanceolate to ovate, thick, rigid, long- to short-acuminate, only a little narrowed towards the base, rounded below, hollowed above, 12 - 35 × 3 - 5 cm, grey-glaucous or light yellow-green, or sometimes purple-tinged, margins nearly straight or with strong prominences; marginal teeth variable, friable, straight or variously curved, rarely 2-tipped, larger teeth 3 - 15 mm, brown or more often yellowish-grey; terminal **Sp** subulate, frequently sinuous, shallowly grooved above, 2 - 4 cm, glaucous-grey, not or only a little decurrent; **Inf** 2 - 3.5 m, 'paniculate', slender, narrow, part-**Inf** short, 5 - 8 per **Inf**; **Fl** 40 - 45 mm; **Ov** ± 25 mm, with unconstricted long neck (5 mm); **Tep** yellow to pink, tube shallow, 3 - 4 mm, lobes 12 - 15 mm.

Closely related to *A. deserti* and *A. cerulata* (Gentry 1982: 405).

A. tecta Trelease (Trans. Acad. Sci. St. Louis 23: 145, pl. 26-27, 1915). **T**: Guatemala (*Trelease* 17 [ILL]). – **D**: Guatemala (region of Quezaltenango); cultivated only. **I**: Gentry (1982: 597, 613-614).

[2b] Stem very thick and broad; **Ros** semi-globose, open, 2 × 4 m, broad, freely suckering; **L** broadly lanceolate, straightly ascending, base deeply convex and thick, becoming thinner upwards, acuminate, concave to guttered, 100 - 160 × 30 - 40 cm, margins undulate; marginal teeth 8 - 10 mm (middle of the lamina), dull brown, 2 - 6 cm apart, cusps flattened, triangular, straight or curved from low bases; terminal **Sp** subulate, narrowly shortly grooved above, 5 - 7 cm, dull brown, decurrent or not; **Inf** 5 - 7 m, 'paniculate', massive; **Fl** 85 - 95 mm; **Ov** 38 - 43 mm, neck grooved, not constricted; **Tep** red-tinged in bud, greenish-yellow, tube funnel-shaped, 17 - 18 mm, lobes unequal, outer 32 - 33 mm.

Geographically isolated from other members of Group *Salmianae*; possibly a remnant of former use and now cultivated as a fence plant (Gentry 1982: 614).

A. tenuifolia Zamudio & E. Sánchez (Acta Bot. Mex. 37: 47-52, ill., 1995). **T**: Mexico, Querétaro (*Carranza* 1905 [IEB]). – **D**: Mexico (Tamaulipas, Querétaro); limestone slopes in pine-oak forest, 450 - 1500 m.

[1a] **Ros** lax, caespitose, forming dense groups by axillary or rhizomatous branching; **L** 30 - 50 (-90), linear, subcoriaceous, very thin and flexible, young straight, mature recurved, (29-) 50 - 100 (-130) × 0.25 - 0.5 (middle) - 1.3 (base) cm, green, striate, margins horny, < 1 mm wide, light green or hyaline, shortly serrulate; terminal **Sp** conical-subulate, 0.4 - 1 cm, coffee-reddish; **Inf** (0.9-) 1.5 - 1.75 (-2.3) m, 'spicate', straight, thin, lax, scape **Bra** triangular, long-cuspidate, (3-) 7 - 10 (-25) cm, decreasing in size towards the **Inf** tip, part-**Inf** (19-) 23 - 25 (-44) per **Inf**, with geminate **Fl** in the upper 1/3 of the **Inf**; **Fl** tubular, 23 - 30 mm; **Ov** cylindrical, sulcate, (6-) 9 - 12 mm; **Tep** yellow-greenish, tube 12 - 15 mm, lobes 4 - 7 mm.

According to the protologue close to *A. striata* ssp. *striata* but differing in its lax rosettes, fewer larger and pliable recurved leaves and its lax 'spikes' with geminate flowers. It differs from all other members of group *Striatae* in having fewer and longer leaves, lax inflorescences, and short stamens which are only shortly exerted.

A. tequilana F. A. C. Weber (Bull. Mus. Hist. Nat. (Paris) 8: 220, ill., 1902). **T**: [icon]: l.c. fig. 1. – **Lit**: McVaugh (1989). **D**: Mexico (Sonora, Sinaloa, Jalisco, Michoacán, Oaxaca); cultivated only. **I**: Gentry (1982: 555, 583).

Incl. *Agave palmaris* Trelease (1920); **incl.** *Agave pedrosana* Trelease (1920); **incl.** *Agave pesmulae* Trelease (1920); **incl.** *Agave pseudotequilana* Trelease (1920); **incl.** *Agave subtilis* Trelease (1920).

[2f] Stem short, thick, mature 30 - 50 cm; **Ros** radiately spreading, 1.2 - 1.8 m, surculose; **L** lanceolate, ascending to horizontal, firmly fibrous, mostly rigidly spreading, narrow and thickened towards the base, widest in the middle, acuminate, 90 - 120 × 8 - 12 cm, generally glaucous bluish- to grey-green, sometimes cross-zoned, margins straight to undulate or repand; marginal teeth generally regular in size or spacing or rarely irregular, mostly 3 - 6 mm (middle of the lamina), light to dark brown, 1 - 2 cm apart, with slender cusps curved from low pyramidal bases, rarely teeth remote and longer; terminal **Sp** flattened or openly grooved above, generally short, 1 - 2 cm, rarely longer, base broad, dark brown, decurrent or not; **Inf** 5 - 6 m, 'paniculate', densely branched, part-**Inf** large, dense, diffusely several times compound, 20 - 25 per **Inf**; **Fl** 68 - 75 mm; **Ov** 32 - 38 mm, neck short, not constricted; **Tep** green, tube funnel-shaped, 10 mm, lobes subequal, 25 - 28 mm. – *Cytology*: 2n = 60.

Distinctive from its close relative *A. vivipara* (as *A. angustifolia*) by larger leaves, thicker stems, and heavier more diffuse inflorescences with relatively large flowers with rather short tubes, albeit these differences are of degree rather than clear-cut (Gentry 1982: 583).

A. tequilana is important as source of the distilled

liquor Tequila. For this purpose, it is cultivated in large plantations, esp. around the town of Tequila (Jalisco).

A. thomasaе Trelease (Trans. Acad. Sci. St. Louis 23: 138, 1915). **T**: Guatemala (*Trelease* 19 [ILL]). – **D**: Guatemala; pine-forest zone, 2000 - 2800 m. **I**: Gentry (1982: 501).

[2k] **Ros** openly spreading, medium-sized, solitary or moderately suckering; **L** broadly lanceolate, softly succulent, pliable, narrowed and thickened towards the base, acuminate, plane to mildly guttered, smooth to slightly asperous below, 60 - 120 × 12 - 17 cm, pruinose or light glaucous to pale green; marginal teeth minute, 1 - 2 mm, 1 - 2 cm apart, reduced to denticles below; terminal **Sp** subulate to acicular, shallowly grooved above, 3 - 4.5 cm, dark brown; **Inf** 5 - 8 m, 'paniculate', narrow, scape short, part-**Inf** congested, roundish, 30 - 60 in the upper 1/2 - 5/8 of the **Inf**; **Fl** 60 - 70 mm; **Ov** strongly trigonous, 30 - 38 mm, tapering from the tube or with a short grooved neck; **Tep** purple to yellow, tube funnel-shaped, 6 - 11 mm, lobes unequal, 19 - 29 mm.

One of the few suckering Agaves in Guatemala. Distinguished by its soft grey-pruinose leaves with minute teeth and variously coloured flowers with strongly trigonous ovaries (Gentry 1982: 500).

A. titanota Gentry (Agaves Cont. North Amer., 176-180, ill., 1982). **T**: Mexico, Oaxaca (*Gentry & Tejeda* 22474 [US, DES, MEXU]). – **D**: Mexico (N Oaxaca); limestone canyon, 1070 - 1200 m, known only from the type locality. **Fig. VI.g**

[1g] **Ros** subcaulescent, openly spreading, medium-sized, solitary or sparingly surculose; **L** linear-ovate, broad, rigid, thick towards the base, short-acuminate, apex involute above, keeled and convex below, plane or concave above, finely granular, 35 - 55 × 12 - 14 cm, alabaster-white, margins horny, undulate to crenate, widest towards **L** tip (3 - 5 mm), continuous to the base or nearly so; marginal teeth variable, larger teeth 8 - 12 (-20) mm, variably spaced, **L** tip sometimes toothless for the uppermost 8 - 12 cm; terminal **Sp** broadly conical, keeled and protruding below, 3 - 4 cm, dark brown to grey; **Inf** erect, ± 3 m, 'spicate', flowering in the upper 1/2, part-**Inf** with geminate **Fl**; **Ped** geminate, 1 - 2 cm; **Fl** 45 - 50 mm; **Ov** 22 - 25 mm, pale greenish, neck constricted; **Tep** yellow, tube broadly funnel-shaped, 2 - 4 mm, lobes 21 - 24 mm.

Distinctive within Group *Marginatae* with its broad glaucous-white leaves (Gentry 1982: 179).

A. toumeyana Trelease (CUSNH 23: 140, 1920). **T**: USA, Arizona (*Toumey* 442 [US]). – **D**: USA (C Arizona).

A. toumeyana ssp. *bella* (Breitung) Gentry (Agaves Cont. North Amer., 211, ill. (pp. 212-213),

1982). **T:** USA, Arizona (*Breitung & Gibbons* 18153 [CAS]). – **D:** USA (C Arizona); open stony slopes and benches in juniper chaparral, 1250 - 1560 m. **Fig. VII.b**

≡ *Agave toumeyana* var. *bella* Breitung (1960).

[1e] Differs from ssp. *toumeyana*: **L** 100 or more, linear, more equal, smaller, 9 - 20 cm, margins replaced by denticles in the lower ½ of the **L**; **Inf** smaller. – *Cytology*: 2n = 60.

A. toumeyana ssp. *toumeyana* – **D:** USA (C Arizona); open limestone or volcanic rocky ledges, highland desert, chaparral, or lower pine forest, 625 - 1400 m. **I:** Gentry (1982: 196, 208). **Fig. VII.c**

Incl. *Agave toumeyana* var. *toumeyana*.

[1e] **Ros** small, densely caespitose; **L** 40 - 70, linear-lanceolate, straight or falcate or upcurving, rather rigid, thickly convex towards the base, plane above, of unequal length, smooth, 20 - 30 × 1.5 - 2 cm, light green or yellowish, both faces with impressions from the central bud, margins fine, brown with white threads, sometimes serrulate at the base; terminal **Sp** subulate, with a short narrow groove above, 1 - 2 cm, brown to greyish; **Inf** 1.5 - 2.5 m, 'spicate', densely or laxly flowered in the upper ½, part-**Inf** with geminate **Fl**; **Ped** basally united, short; **Fl** 18 - 25 mm; **Ov** 10 - 15 mm, neck slender, bent, 3 - 5 mm; **Tep** saccate, curved downwards, green, lobes whitish, tube broadly spreading, angled, 2 - 4 mm, lobes subequal, 7 - 9 mm.

The species suggests a large version of *A. parviflora*, but the leaves are always more acuminate, the flowers larger, the filaments are inserted higher up in the tube, and the lobes are more elongate (Gentry 1982: 210). Both ssp. hybridize with *A. chrysantha* (Hodgson 1999).

A. triangularis Jacobi (Nachtr. Versuch syst. Glied. Agaveen 2: 149, 1869). **T** [neo]: Mexico, Puebla (Gentry 23399 [DES, MEXU]). – **D:** Mexico (Puebla, Oaxaca); limestone soils, 1700 - 1900 m. **I:** Gentry (1982: 181-182). **Fig. VII.f**

≡ *Agave horrida* var. *triangularis* (Jacobi) Baker (1877); **incl.** *Agave regeliana* hort. ex Jacobi (1868) (*nom. illeg.*, Art. 53.1); **incl.** *Agave rigidissima* Jacobi (1869); **incl.** *Agave kerkhovei* hort. ex Jacobi (1870) (*nom. illeg.*, Art. 53.1); **incl.** *Agave hanburyi* Baker (1892); **incl.** *Agave triangularis* var. *subintegra* Trelease (1920).

[1g] Stem short; **Ros** rigid, slow-growing, widely surculose, forming open clusters; **L** deltoid-lanceolate, straight, rigid, thick at the base, long-acuminate, upper face concave, lower face convex, finely asperous, 30 - 60 × 5 - 7 (middle of the lamina) cm, olivaceous or light yellowish-green, finely flecked with brownish-red, margins horny, continuous, straight, 1 - 2 mm wide, greyish; marginal teeth present or lacking, straight or curved, few, small, 2 - 3 mm, remote, 3 - 5 cm apart, or large, 5 - 9 mm, and 1 - 2 cm apart, grey; terminal **Sp** conical to subu-

late, usually straight, 2.5 - 4 cm, greyish; **Inf** unknown.

Recognizable by its thick rigid deltoid olivaceous leaves. Toothless forms are common (Gentry 1982: 181).

A. tubulata Trelease (Mem. Nation. Acad. Sci. 11: 45, t. 99-100, 1913). **T:** Cuba (*Britton & al.* 9746 [MO]). – **Lit:** León (1946); Álvarez de Zayas (1985). **D:** W Cuba.

Incl. *Agave ekmannii* var. *microdonta* Trelease in sched. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave ekmannii* Trelease (1926); **incl.** *Agave tubulata* ssp. *brevituba* A. Álvarez (1985).

[2m] **Ros** not described; **L** broadly lanceolate, gradually acute or subacuminate, sometimes conduplicate, 60 - 75 (-90) × 15 - 20 cm, rather glossy green, margins with teeth on green prominences or repand between the teeth; marginal teeth prevalently upcurved towards the **L** tip and recurved towards the base, lunate rather than lenticular at the base, 1 - 3 mm, 1.5 - 2 cm apart, slender-cusped; terminal **Sp** acicularly conical, somewhat upcurved or flexuous, round-grooved or involute below the middle, smooth, 1.5 cm, brown, dull, decurrent; **Inf** 'paniculate', 2 - 5 m; **Fl** 30 - 35 mm; **Ov** 15 mm; **Tep** yellow, tube narrowly funnel-shaped, 6 - 8 mm, lobes 12 mm; **Fr** broadly oblong, shortly but distinctly stipitate and beaked, 2 - 3.5 × 1.2 - 1.5 cm.

The recently described ssp. *brevituba* differs but very slightly, and since material cited for the new taxon was also mentioned in the protologue by Trelease, it is here included in the synonymy.

A. underwoodii Trelease (Mem. Nation. Acad. Sci. 11: 37, t. 67-71, 1913). **T:** Cuba (*Trelease* 2+3 [MO?]). – **Lit:** León (1946). **D:** W Cuba.

Incl. *Agave morrisii* Worsley (1895) (*nom. illeg.*, Art. 53.1); **incl.** *Agave americana* Millspaugh (1900) (*nom. illeg.*, Art. 53.1).

[2l] **Ros** solitary; **L** ± narrowly lanceolate, gradually or in the broader forms acuminate pointed, concave, 100 - 200 × 20 - 25 cm, green, margins straight or somewhat concave; marginal teeth straight or somewhat curved or occasionally hooked (mostly downwards), rather strongly triangular from lenticular bases, 2 - 5 mm, brown or chestnut-brown, ± 1 (-2 or even 3) cm apart, exceptionally on green prominences; terminal **Sp** triquetrously conical or somewhat subulate, straight or slightly upcurved, openly grooved to or beyond the middle or involute, smooth or a little roughened, 1.5 - 2.5 cm, brown, rather dull, decurrent and somewhat dorsally intruded into the green **L** tissue; **Inf** 4 - 8 m, 'paniculate', broad, part-**Inf** on sharply recurved **Br**, in the upper ¾ or more of the **Inf**, not known to be bulbiferous; **Fl** 50 - 55 mm; **Ov** 25 - 35 mm; **Tep** golden-yellow, tube conical, conduplicate, ± 8 mm, lobes 15 - 20 mm; **Fr** narrowly oblong, stipitate and beaked, 4 - 4.5 × 1.5 cm.

Rather variable (color of the terminal spine and the marginal teeth, shape of the groove of the terminal spine, length of the tepal lobes, exertion of the filaments) according to the protologue.

A. utahensis Engelm (in S. Watson, Bot. US Geol. Expl. 40. Parallel, 5: 497, 1871). **T** [lecto]: USA, Utah (Palmer s.n. [MO, US]). – **D**: USA (California, Utah, Nevada, Arizona).

≡ *Agave haynaldii* var. *utahensis* (Engelm) A. Terracciano (1885).

A. utahensis ssp. **kaibabensis** (McKelvey) Gentry (Agaves Cont. North Amer., 259, 1982). **T**: USA, Arizona (McKelvey 4381 [A]). – **D**: USA (N Arizona). **I**: Gentry (1982: 252). **Fig. VII.d**

≡ *Agave kaibabensis* McKelvey (1949) ≡ *Agave utahensis* var. *kaibabensis* (McKelvey) Breitung (1960).

[1h] Differs from ssp. *utahensis*: Stem forming a short trunk with age; **Ros** larger, 40 - 60 cm Ø, usually solitary; **L** mostly 30 - 50 × 3 - 5 cm, light to bright green, younger **L** frequently pruinose-glaucous; **Inf** 3.5 - 5 m, stout, scape 4 - 6 cm Ø, part-**Inf** with 4 - 12 clustered **Fl**; **Fl** as in ssp. *utahensis* but larger.

A. utahensis ssp. **utahensis** – **D**: USA (California, Utah, Nevada, Arizona). **I**: Gentry (1982: 252, 258, 260-261).

Incl. *Agave utahensis* var. *utahensis*; **incl.** *Agave newberryi* Engelm (1875); **incl.** *Agave scaphoidea* Greenman & Roush (1929) ≡ *Agave utahensis* var. *scaphoidea* (Greenman & Roush) M. E. Jones (1930); **incl.** *Agave utahensis* var. *nevadensis* Engelm ex Greenman & Roush (1929) ≡ *Agave nevadensis* (Engelm ex Greenman & Roush) Hester (1943); **incl.** *Agave utahensis* var. *discreta* M. E. Jones (1930); **incl.** *Agave eborispina* Hester (1943) ≡ *Agave utahensis* var. *eborispina* (Hester) Breitung (1960); **incl.** *Agave utahensis* fa. *nuda* hort. ex E. & B. Lamb (1978) (*nom. inval.*, Art. 32.1c?).

[1h] **Ros** rather compact, small, 18 - 30 × (15-) 25 - 40 cm Ø, caespitose; **L** 70 - 80, linear-lanceolate, stiff, straight or falcate or upcurving, convex below, plane to concave above, mostly 15 - 30 × 1.5 - 3 cm, light greyish- to yellow-green, in dwarf forms also bluish grey-glaucous; marginal teeth blunt, thick, detachable, larger teeth mostly 2 - 4 mm, brown-ringed around the bases, light grey, 1 - 2.5 cm apart; terminal **Sp** acicular, 2 - 4 cm, light grey or ivory-white, decurrent for 1 - 3 cm; **Inf** 2 - 4 m, 'spicate', lax or congested, scape 2 - 3 cm Ø, part-**Inf** with 2 - 8 clustered **Fl**; **Fl** sessile, urceolate, 25 - 31 mm; **Ov** 15 - 20 mm, neck long, 4 - 6 mm, constricted; **Tep** yellow, tube broadly funnel-shaped, very short, 2.5 - 4 mm, lobes nearly equal, 9 - 12 mm. – *Cytology*: 2n = 120.

A. utahensis var. *nevadensis* and var. *eborispina*, both accepted by Gentry (1982), are included in the synonymy of ssp. *utahensis* by Little (1981) and McKinney (1993), and this concept is adopted here. Gentry (l.c., 261) also mentions 'transitional forms'. Both varieties are best regarded as mere dwarf forms with large elongated spines from montane limestone outcrops. *A. utahensis* (ssp. *kaibabensis*) includes the N-most *Agave*-localities where temperatures may drop down to -18°C; plants from these populations may be hardy outdoors in C Europe with some protection from moisture.

A. variegata Jacobi (Hamburg, Gart.- & Blumenzeit. 21: 459-462, 1865). – **D**: USA (S Texas), Mexico (Nuevo León, Hidalgo, Puebla, San Luis Potosí, Tamaulipas, C Veracruz, naturalized in Yucatán); dry chaparral sites, on slopes, or between rocks, and in moist oak woods, 10 - 1830 m, flowers mainly March to June. **I**: Berger (1915: 35); Addisonia 17: pl. 569, 1932.

≡ *Manfreda variegata* (Jacobi) Rose (1903) ≡ *Po-lianthes variegata* (Jacobi) Shinnars (1966); **incl.** *Manfreda tamazunchalensis* Matuda (1966); **incl.** *Manfreda xilitlensis* Matuda (1966).

[3a1] Plants medium-sized (for Subgen. *Manfreda*); **L** erect-arching, linear-lanceolate, deeply channelled, 14 - 44 × 1.2 - 2.7 (-3.9 in cultivation) cm, dark green, unspotted, or spotted with lighter green and brown or green, spots round to elliptic, sometimes glaucous, margins usually with small distantly spaced teeth; **Inf** 0.6 - 1.4 (-1.8 in cultivation) m, 'spicate', flowering part (7.5-) 14 - 22 (-29; to 48 in cultivation) cm, with 7 - 29 (-41) spreading **Fl**; **Ov** 9 - 16 (-19) mm; **Tep** tube 6 - 16 mm, lobes (6-) 9 - 13 (-16) mm, inside yellow-green or mahogany-brown; **Sty** exceeding the tube; **Fr** globose to oblong, 1.6 - 1.8 (-2.5) × 1.3 - 1.6 cm; **Se** 4 - 5 × 3 - 4 mm.

This species is notable within Subgen. *Manfreda* for its succulent minutely toothed and often spotted leaves, its tall inflorescence stalks, and flowers with short campanulate tubes and long-exserted stamens and styles (Verhoek-Williams 1975: 194).

A. vicina Trelease (Mem. Nation. Acad. Sci. 11: 19, t. 4, 10, 1913). **T** [syn]: Aruba (*Boldingh* 3&5 [MO]). – **Lit**: Hummelinck (1936). **D**: Leeward Islands (Aruba, Bonaire, Curaçao, Margarita). **I**: Hummelinck (1993).

Incl. *Agave vivipara* Crantz (1766) (*nom. illeg.*, Art. 53.1); **incl.** *Agave vivipara* var. *cabaiensis* Hummelinck (1936); **incl.** *Agave vivipara* var. *cuebensis* Hummelinck (1936).

[2q] **Ros** nearly acaulescent, ± 1 - 1.2 m Ø, suckering; **L** very broadly lanceolate, subacuminate, flatly concave, (17-) 40 - 60 (-75) × (5-) 12 - 20 cm, somewhat transiently glaucous, with age rather glossy green, margins a little concave; marginal teeth commonly upcurved in the upper ½ of the **L**

and recurved in the lower $\frac{1}{2}$, slender from lunate bases, 3 - 4 mm, 1 - 1.5 cm apart, often on green prominences; terminal **Sp** triquetrously acicular, somewhat flexuous, narrowly round-grooved to the middle and involute below, smooth, polished towards the tip, 2.5 - 3 cm, red-brown, shortly decurrent; **Inf** scarcely 3 m, narrowly oblong, part-**Inf** on ascending **Br** in the upper $\frac{1}{2}$ or more of the **Inf**, freely bulbilliferous; **Fl** 40 - 45 mm; **Ov** oblong, 20 - 25 mm; **Tep** yellow, tube open, $\pm$ 4 mm, lobes 15 mm; **Fr** broadly oblong, very shortly stipitate and beaked, 3×2.5 cm. – *Cytology*: $2n = 60$.

This is the first-named Caribbean species in the genus, for long known under the misapplied name *A. vivipara* – a name erroneously used for many other Caribbean species. The nomenclatural confusion was clarified by Wijnands (1983), who showed that *A. vivipara* actually represents the oldest name for the widespread continental taxon previously referred to as *A. angustifolia*, which is consequently renamed here (see there). *A. vicina* is the oldest available binomial that clearly refers to the Caribbean plants in question. See also the note for *A. cocui*.

A. victoriae-reginae T. Moore (Gard. Chron., ser. nov. 4(94): 484-485, fig. 101, 1875). **T**: [lecto – icono] l.c. fig. 101. – **Lit**: Ullrich (1991d). **D**: Mexico (S Coahuila, C Nuevo León, NE Durango). **I**: Gentry (1982: 126, 183, 185). **Fig. VII.e**

Incl. *Agave victoriae-reginae* fa. *variegata* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave victoriae-reginae* var. *compacta* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave victoriae-reginae* var. *stolonifera* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave considerantii* Carruel (1875); **incl.** *Agave nickelsiae* Gosselin (1895) $\equiv$ *Agave victoriae-reginae* fa. *nickelsiae* (Gosselin) Trelease (1920); **incl.** *Agave victoriae-reginae* var. *laxior* A. Berger (1912); **incl.** *Agave ferdinandi-regis* A. Berger (1915); **incl.** *Agave victoriae-reginae* fa. *dentata* Breitung (1960); **incl.** *Agave victoriae-reginae* fa. *latifolia* Breitung (1960); **incl.** *Agave victoriae-reginae* fa. *longifolia* Breitung (1960); **incl.** *Agave victoriae-reginae* fa. *longispina* Breitung (1960); **incl.** *Agave victoriae-reginae* fa. *viridis* Breitung (1960); **incl.** *Agave victoriae-reginae* fa. *ornata* Breitung (1960) (*nom. inval.*, Art. 37.1); **incl.** *Agave victoriae-reginae* fa. *stolonifera* H. Jacobsen (1960) (*nom. inval.*, Art. 37.1).

[1g] **Ros** acaulescent or (in cultivation) with a short stem, compact, very variable, small, solitary, surculose or caespitose; **L** linear to ovate, rigid, thick, short, generally closely imbricate, rounded at the tip, rounded to sharply keeled below, plane to concave above, 15 - 20 (-25) $\times$ 4 - 6 cm, green with conspicuous white markings, margins white-horny, continuous to the **L** base, 2 - 5 mm wide; marginal teeth usually none; terminal **Sp** 1 or 3, trigonous-conical, subulate, very broad at the base, 1.5 - 3 cm,

black; **Inf** erect, 3 - 5 m, 'spicate', densely flowered in the upper $\frac{1}{2}$, part-**Inf** with 2 - 3 **Fl**; **Ped** forking, stout, 40 - 46 mm; **Fl** 40 - 46 mm; **Ov** thickly fusiform, 18 - 24 mm, neck short; **Tep** variously coloured, frequently tinged red or purple, tube shallow, funnel-shaped, 3 mm, lobes $\pm$ equal, 18 - 20 mm. – *Cytology*: $2n = 60, 120$.

Typically easily identified by the toothless, thick and rigid leaves with white markings on both faces. The extreme variation is added to by apparent introgressive hybrid swarms with *A. asperrima* and *A. lechuguilla* (Gentry 1982: 185). The lectotype cited above was designated by Ullrich (1990e) and supersedes the neotype designation by Gentry (1982: 184).

A. vilmoriniana A. Berger (RSN 12: 503, 1913). **T** [lecto]: Mexico, Guadalajara (*Rose & Hough* 4833 [US]). – **Lit**: McVaugh (1989); Turner & al. (1995). **D**: Mexico (S Sonora, Chihuahua, Sinaloa, Durango, Zacatecas, Aguascalientes, Jalisco); on volcanic barranca cliffs, 600 - 1700 m. **I**: Gentry (1982: 67, 83-84).

Incl. *Agave edwardii* Trelease ms. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Agave eduardii* Trelease (1920); **incl.** *Agave houghii* hort. ex Trelease (1920); **incl.** *Agave mayoensis* Gentry (1942).

[1b] Stem short; **Ros** $\pm 1 \times 2$ m, solitary; **L** linear-lanceolate, arching, pliable, deeply guttered, broadest at the base, heavily thickened towards the base, long acuminate, concave to conduplicate above, smooth, 90 - 180 $\times$ 7 - 10 cm, light to yellowish-green, margins with a fine brown continuous border ± 1 mm wide, scaly with age; marginal teeth none; terminal **Sp** acicular, 1 - 2 cm, brown to greyish-brown; **Inf** 3 - 5 m, 'spicate', densely flowered from 1 to 2 m above base, bulbilliferous or not, part-**Inf** with 2 - 4 (-8) **Fl**; **Ped** 1 - 2 times forked, 8 - 20 mm; **Fl** 35 - 40 mm; **Ov** 15 - 20 mm incl. a neck 3 - 4 mm long; **Tep** yellow, tube open, shallow, 4 mm, lobes equal, 14 - 17 mm.

A. virginica Linné (Spec. Pl. [ed. 1], 323, 1753). **T**: USA, Virginia (*Clayton* 498 [LINN, BM]). – **Lit**: Diggs & al. (1999: with ills.). **D**: S and E USA (from Missouri and Texas to the Atlantic).

$\equiv$ *Manfreda virginica* (Linné) Salisbury ex Rose (1899) $\equiv$ *Polianthes virginica* (Linné) Shinnors (1966).

The species is aberrant in being the only member of Subgen. *Manfreda* occurring in temperate regions. In addition to its distribution, the taxon is easily recognized by its slender green flowers with erect lobes and the style that is shorter than the stamens (Verhoek-Williams 1975: 170, 172).

A. virginica ssp. *lata* (Shinnors) Thiede & Eggle (KuaS 52: [in press], 2001). **T**: USA, Texas (*Daly* 61 [BRIT / SMU]). – **D**: USA (S Oklahoma, N-C

Texas); mainly in the Backland Prairie, flowers mid-June to mid-July.

≡ *Agave lata* Shinnery (1951) ≡ *Polianthes lata* (Shinnery) Shinnery (1966) ≡ *Manfreda virginica* ssp. *lata* (Linné) O'Kennon & al. (1999).

[3a4] Differs from ssp. *virginica*: **L** 4 - 10, 12 - 18 × (2-) 3 - 8 (-10) cm, 3 - 6× as long as broad; **Inf** scape near the base 6 - 10 mm Ø; **Ov** 7 - 8 mm; **Tep** tube 19 - 27 mm, lobes 2.5 - 3 mm wide at the base; **Anth** 13 - 17 (-20) mm.

Verhoek-Williams (1975) included this taxon in the synonymy of the widespread and variable *Manfreda virginica*. Recently, Diggs & al. (1999) re-emphasized the clear, albeit overlapping differences between *A. lata* and *A. virginica*, and recognized the former at subspecies rank.

A. virginica ssp. *virginica* – **D**: S and E USA (from Missouri and Texas to the Atlantic); wooded areas, on rocky and sandy soils, flowers mid-July to mid-August.

Incl. *Agave pallida* Salisbury (1796); **incl.** *Agave virginica* var. *tigrina* Engelm. (1875) ≡ *Manfreda tigrina* (Engelm.) Small ex Rose (1903) ≡ *Manfreda virginica* var. *tigrina* (Engelm.) Rose (1903) ≡ *Agave virginica* fa. *tigrina* (Engelm.) Palmer & Steyermark (1935) ≡ *Agave tigrina* (Engelm.) Cory (1936) ≡ *Polianthes virginica* fa. *tigrina* (Engelm.) Shinnery (1966); **incl.** *Allibertia intermedia* Marion (1882); **incl.** *Agave aliberti* Baker (1883).

[3a4] Plants medium-sized (for Subgen. *Manfreda*); rhizome 1 - 2.5 (-5) × 1 - 2.3 (-2.6) cm; **R** numerous, half-fleshy; **L** ± 10, semisucculent, spreading, oblanceolate to linear-lanceolate, 12 - 15 (-30) × 1 - 4.5 cm, 7 - 15× as long as broad, usually plain green with red spots and speckles near the base, upper face frequently sparsely or densely spotted, sometimes plain green, margins with a narrow cartilaginous band, entire or with regularly or irregularly spaced short or medium-sized prickles; remains of **L** bases membranous, 1.8 - 4 (-4.5) cm; **Inf** 0.75 - 1.9 (-2.12) m, scape 4 - 7 mm Ø near the base; flowering part 14 - 68 cm, with 10 - 44 (-61) **Fl** (lower **Fl** rarely paired) in a dense 'spike'; **Fl** nearly erect, green; **Ov** (4-) 5 - 7 mm; **Tep** tube narrow, at a slight angle to the **Ov** and constricted above it, 9 - 16 mm, lobes erect, 1.5 mm wide at the base, sometimes tinged with purple; **Anth** 8 - 10 mm; **Sty** shorter than the **St**; **Sti** white, 3-lobed; **Fr** globose, 1 - 1.8 (-2.5) × 1 - 1.7 cm; **Se** 3 - 5 × 4 - 6 mm. – *Cytology*: n = 30.

A. vivipara Linné (Spec. Pl. [ed. 1], 323, 1753). **T**: [lecto – icono]: Commelin, Prael. Bot. 65: t. 15. – **D**: Mexico (widespread), C America to Panama; naturalized in RSA.

Incl. *Aloe vivipara* Crantz (1766).

A. vivipara 'Marginata' (Hort. ex Gentry) P. I.

Forster (Brittonia 44: 74, 1992). **Nom. inval.**, Art. 28 Note 4. – **I**: Gentry (1982: 565).

≡ *Agave angustifolia* var. *marginata* hort. ex Gentry (1982) (*nom. inval.*, Art. 36.1, 37.1).

[2f] Differs from var. *vivipara*: Stems 30 - 60 cm; **L** numerous, with narrow white or yellow margins.

Representing a horticultural selection only, now widely distributed around the world as an ornamental (Gentry 1982: 564).

A. vivipara 'Variegata' (Trelease) P. I. Forster (Brittonia 44: 75, 1992).

≡ *Agave angustifolia* var. *variegata* Trelease (1908).

[2f] Differs from var. *vivipara*: **L** with unusual broad marginal white stripe, remainder of the **L** silvery grey or milky.

Representing a horticultural selection only, which is reported to have arisen in the Botanical Garden of the College of Science at Poona, India, about 1895 (Gentry 1982: 567).

A. vivipara var. *deweyana* (Trelease) P. I. Forster (Brittonia 44: 74, 1992). **T**: Mexico, Tamaulipas (*Dewey* 649 [US]). – **D**: Cultivated only: Mexico (Tamaulipas, Veracruz).

≡ *Agave deweyana* Trelease (1909) ≡ *Agave angustifolia* var. *deweyana* (Trelease) Gentry (1982).

[2f] Differs from var. *vivipara*: **L** narrow in the type (5 - 6 cm), but wider in later collections, generally 110 - 115 × 7 - 10 cm; marginal teeth more remote in some collections.

This taxon is "not well marked", since various clones appear to be cultivated under this name (Gentry 1982: 564). This and the following varieties apparently represent mere cultivated selections and cultivars and should better be named as such.

A. vivipara var. *letonae* (Taylor ex Trelease) P. I. Forster (Brittonia 44: 74, 1992). **T**: El Salvador (*Milner* s.n. [MO]). – **D**: Cultivated only (for fibre): Guatemala, El Salvador. **I**: Gentry (1982: 565-566).

≡ *Agave letonae* Taylor ex Trelease (1925) ≡ *Agave angustifolia* var. *letonae* (Taylor ex Trelease) Gentry (1982).

[2f] Differs from var. *vivipara*: Stem broad; **Ros** robust; **L** nearly white.

A. vivipara var. *nivea* (Trelease) P. I. Forster (Brittonia 44: 74, 1992). **T**: Guatemala, Progreso Dept. (*Trelease* 11 [MO]). – **D**: Cultivated only (for fibre and fences): Guatemala. **I**: Trelease (1915b: pl. 22).

≡ *Agave nivea* Trelease (1915) ≡ *Agave angustifolia* var. *nivea* (Trelease) Gentry (1982).

[2f] Differs from var. *vivipara*: Stem short; **L** long, 130 - 140 × 9 - 10 cm, characteristically dull bluish-grey; **Inf** unknown.

A. vivipara var. *sargentii* (Trelease) P. I. Forster

(Brittonia 44: 75, 1992). **T:** [lecto – icono]: Annual Rep. Missouri Bot. Gard., 22: pl. 100-101, 1912. – **D:** Cultivated only: Mexico (México, Puebla?).

≡ *Agave angustifolia* var. *sargentii* Trelease (1912).

[2f] Differs from var. *vivipara*: Stem ± 25 cm; **Ros** dwarf; **L** numerous, narrowly oblong-lanceolate, minutely roughened, 25 - 30 × 2.5 - 3 cm, greyish-green; marginal teeth 1 - 2 mm, nearly black, glossy; **Inf** ± 1 m, part-**Inf** few, bulbiliferous; **Fl** 40 mm.

A. vivipara var. *vivipara* – **Lit:** León (1946); McVaugh (1989); Turner & al. (1995). **D:** Mexico (widespread from Sonora and Chihuahua to the S), Belize, Costa Rica, Honduras, Nicaragua, El Salvador, Panama; mainly tropical savannas, thorn forest, and tropical deciduous forests at low to middle elevations (to 1500 m, rarely more); naturalized in RSA. **I:** Gentry (1982: 555, 560); Hummelinck (1993). **Fig. VII.a**

Incl. *Agave angustifolia* var. *angustifolia*; **incl.** *Agave lurida* Jacquin (1790) (*nom. illeg.*, Art. 53.1); **incl.** *Agave angustifolia* Haworth (1812); **incl.** *Agave flaccida* Haworth (1812); **incl.** *Agave rigida* Spin (1812) (*nom. illeg.*, Art. 53.1); **incl.** *Agave jacquiniana* Schultes (1829) ≡ *Agave lurida* var. *jacquiniana* (Schultes) Salm-Dyck (1861) ≡ *Agave vera-cruz* var. *jacquiniana* (Schultes) Ascherson & Graebner (1906); **incl.** *Agave punctata* Salm-Dyck (1834); **incl.** *Agave rubescens* Salm-Dyck (1834) ≡ *Agave angustifolia* var. *rubescens* (Salm-Dyck) Gentry (1982) ≡ *Agave vivipara* var. *rubescens* (Salm-Dyck) P. I. Forster (1992); **incl.** *Agave flaccida* Salm-Dyck (1834) (*nom. illeg.*, Art. 53.1); **incl.** *Agave ixtli* Karwinsky ex Salm-Dyck (1837); **incl.** *Agave serrulata* Karwinsky ex Otto (1842) (*nom. illeg.*, Art. 53.1); **incl.** *Agave vivipara* Wight (1853) (*nom. illeg.*, Art. 53.1); **incl.** *Agave elongata* Jacobi (1865); **incl.** *Agave excelsa* Jacobi (1866); **incl.** *Agave flavovirens* Jacobi (1866); **incl.** *Agave erubescens* Ellemeeet (1871); **incl.** *Agave ixtlioides* Hooker (1871) (*nom. illeg.*, Art. 53.1); **incl.** *Agave excelsa* Baker (1877) (*nom. illeg.*, Art. 53.1) ≡ *Agave ixtli* var. *excelsa* (Baker) A. Terracciano (1885); **incl.** *Agave spectabilis* Todaro (1878) (*nom. illeg.*, Art. 53.1); **incl.** *Agave sobolifera* var. *serrulata* A. Terracciano (1885); **incl.** *Agave rigida* var. *elongata* Anonymus (1893) (*nom. illeg.*, Art. 53.1); **incl.** *Agave rigida* A. Berger (1898) (*nom. illeg.*, Art. 53.1); **incl.** *Agave aboriginum* Trelease (1907); **incl.** *Agave endlichiana* Trelease (1907); **incl.** *Agave lespinasae* Trelease (1907); **incl.** *Agave wightii* Drummond & Prain (1907); **incl.** *Agave zapupe* Trelease (1907); **incl.** *Agave bergeri* Trelease ex A. Berger (1915); **incl.** *Agave donnell-smithii* Trelease (1915); **incl.** *Agave kirchneriana* A. Berger (1915); **incl.** *Agave prainiana* A. Berger (1915); **incl.** *Agave si-caefolia* Trelease (1915); **incl.** *Agave vivipara* var. *woodrowii* hort. ex A. Berger (1915); **incl.** *Agave*

pacifica Trelease (1920); **incl.** *Agave panamana* Trelease (1920); **incl.** *Agave yaquiana* Trelease (1920); **incl.** *Agave owenii* I. M. Johnston (1924); **incl.** *Agave prolifera* Schott ex Standley (1930); **incl.** *Agave costaricana* Gentry (1949); **incl.** *Agave breedlovei* Gentry (1982) (*nom. inval.*, Art. 34.1a).

[2f] Nearly acaulescent or stem to 20 - 60 (-90) cm; **Ros** radiately spreading, surculose; **L** linear to (very broadly) lanceolate, ascending to horizontal, mostly rigid, hard-fleshy, fibrous, narrowed and thickened towards the base, full-grown generally (40-) 60 - 120 × 3.5 - 10 (-20) cm, light green to glaucous-grey, margins straight to undulate, sometimes thinly cartilaginous; marginal teeth generally small, 2 - 5 mm, rarely longer, commonly reddish-brown or dark brown, evenly and closely spaced or remote, from low narrow bases, cusps slender, ± curved; terminal **Sp** variable, conical to subulate, flat to shallowly grooved above, 1.5 - 3.5 cm, dark brown, greying with age, not or thinly decurrent; **Inf** ± 3 - 5 m, 'paniculate', open, part-**Inf** horizontally spreading to ascending, 10 - 20, sometimes (freely) bulbiliferous; **Fl** (40-) 50 - 65 mm; **Ov** small, tapering at the base, 20 - 30 mm, neck short; **Tep** green to yellow, quickly wilting, drying reflexed along the tube, tube (4-) 8 - 16 mm, lobes unequal, (15-) 18 - 24 mm. – **Cytology:** 2n = 60, 120, 180.

The name *A. angustifolia* Haworth, under which the widespread Mexican / Central American taxon was since long known, represents a homotypic synonym of *A. vivipara* Linné and is also considered taxonomically identical (Wijnands 1983). The name *A. vivipara* was misapplied to several Caribbean species, but is now established here to replace *A. angustifolia*. For the Caribbean species previously named *A. vivipara*, the name *A. vicina* has to be used.

The plants from Panama separated as *A. panamana* (Cseh 1993) merely represent the S-most element in the complex (Lott & García-Mendoza 1994).

A. vivipara var. *rubescens* apparently represents a superfluous separate name for a common narrow-leaved wild form occurring irregularly within the species's range in Mexico (Gentry 1982: 567). Since the leaf measurements given by Gentry fall well into the range of var. *vivipara*, it is included in the synonymy here.

A. vivipara is by far the most wide-ranging species of the family and exhibits an extensive range of variation esp. in vegetative features. It is a sun-loving taxon (although also not rarely found with etiolated growth in light shade) occurring in nearly all vegetation types (albeit mainly in the 'tierra caliente') (Gentry 1982: 561).

A. vizcainoensis Gentry (Occas. Pap. Calif. Acad. Sci. 130: 67-69, ill., 1978). **T:** Mexico, Baja California (Gentry 7469 [US, ARIZ, DES, DS, ME-XU]). – **D:** Mexico (Baja California Sur). **I:** Gentry (1982: 408).

[2h] **Ros** open, 30 - 50 × 50 - 90 cm, surculose or solitary; **L** few, lanceolate, thickly fleshy, rather rigid, narrowed above the base, broadest in the middle, 25 - 40 × 6 - 10 cm, glaucous-grey to green, sometimes reddish, margins undulate, horny above with decurrent terminal **Sp**; marginal teeth nearly straight or curved, slender or broadly flattened, 5 - 10 mm (middle of the lamina), dark brown to greyish, 1 - 3 cm apart; terminal **Sp** stoutly subulate, mostly rather straight, shallowly grooved above, 2.5 - 4 cm, brown to greyish, long-decurrent; **Inf** 2 - 3 m, 'paniculate', part-**Inf** spreading, 8 - 15 in the upper ½ of the **Inf**; **Fl** 65 - 75 mm; **Ov** 36 - 41 mm, green, neck 6 - 8 mm; **Tep** yellow, tube funnel-shaped, 8 - 12 mm, lobes 21 - 26 mm.

Appears to be related to *A. margaritae*, which differs in its small size and short broad long-toothed leaves (Gentry 1982: 407).

A. wallisii Jacobi (Nachtr. Versuch syst. Glied. Agaveen 2: 162, 1870). **T**: Colombia (*Wallis* s.n. [not indicated]). – **Lit**: Berger (1915). **D**: Colombia (mountains of the Río Cauca region).

[2o?] Acaulescent; **L** relatively few, broadly lanceolate, at first erect, somewhat recurved, older spreading to all sides, recurved towards the tip, base thickly fleshy, becoming thin and fibrous upwards, broadest somewhat above the middle, somewhat flatly keel-like thickened below, lower ½ flat or flatly guttered above, upper ½ flatly concave above, tip grooved, fresh green, dull, slightly glaucous, margins somewhat undulate and recurved; marginal teeth very small, triangular, curved upwards, at first pergamentaceous with brownish tip, later horny, chestnut-brown, on flat fleshy basis; **Inf** unknown.

Jacobi based his description on an undeveloped young plant (Berger l.c.). See also *A. cundinamarcensis*.

A. warelliana Baker (Gard. Chron., ser. nov. 1877: 264, fig. 53, 1877). **T**: Ex cult. La Mortola (*Anonymus* s.n. [K, US]). – **D**: Not known from the wild. **I**: Gentry (1982: 232).

[1f] **Ros** (sub-) acaulescent, rather robust, ± 1 × 1.7 m, sparsely surculose, branching axillary; **L** dense, lanceolate-spatulate, erect or spreading, thickly fleshy, slightly constricted above the base, acuminate, upper face flat, lower face convex, 70 - 75 × 13 - 14 (6 - 7 at the base) cm, light pale green or shiny glaucous, margins finely serrulate, brown, denticles 1 mm, 2 mm apart; terminal **Sp** straight, 1.8 - 2 cm, brown, long-decurrent; **Inf** ± 5 m, 'spicate', scape ± 2 m; **Fl** 90 - 95 mm; **Ov** smooth, 40 mm, light green; **Tep** yellow within, violet on the outside and brown-spotted, tube 14 - 15 mm, lobes 35 mm.

This is the largest species in Group *Polycephalae*, esp. notable by its large flowers. It seems close to *A. chiapensis*, but differs in its larger flowers with

smaller bractlets and the finely serrulate brownish leaf margins (Gentry 1982: 231).

A. weberi Cels *ex* Poisson (Bull. Mus. Hist. Nat. (Paris) 17: 230-232, 1901). **T** [neo]: USA, Texas (Gentry & al. 20003 [US, DES, MEXU]). – **D**: Known from cultivation only. **I**: Gentry (1982: 621, 632).

Incl. *Agave franceschiana* Trelease *ex* A. Berger (1912).

[2a] **Ros** open, 1.2 - 1.4 × 2 - 3 m, freely suckering; **L** lanceolate, rather softly fleshy, pliable, straight to recurving, widest in the middle, narrowed below, concave or guttered above, 110 - 160 × 12 - 18 m, green or pruinose-greyish esp. in youth; marginal teeth usually absent along the upper ¼ - ½ of the **L**, margins denticulate below, teeth 1 - 2 mm, ≤ 1 cm apart, rarely toothless throughout; terminal **Sp** subulate, openly shallowly grooved above in the upper ½, 3 - 4.5 cm, brown to greyish, decurrent for several cm; **Inf** 7 - 8 m, 'paniculate', tall, open, part-**Inf** several times compound, diffuse, sometimes bulbiferous; **Fl** 70 - 80 mm; **Ov** 33 - 40 mm, pale green, neck short, grooved, not constricted; **Tep** bright yellow, tube rather urceolate, 18 - 20 mm, lobes subequal, 20 - 24 mm.

Placed in Group *Agave* by Ullrich (1990d: 106), in contrast to Gentry's placement in Group *Viviparae* (as *Sisalanae*).

A. wendtii Cházaro (Cact. Suc. Mex. 42(4): 95, 1997). **T**: Mexico, Veracruz (*Cházaro & Flores Macías* 6645 [XAL, WIS]). – **D**: Mexico (Veracruz); tropical evergreen forest, known only from the type locality.

[1f] **Ros** lax, to 45 cm Ø; **L** lanceolate-oblong, fleshy, brittle, 10 - 25 × 2.5 - 3.5 cm, glaucous when young, later turning light green; marginal teeth small, concolorous with the lamina; terminal **Sp** 1 cm, dark; **Inf** 1 m, 'spicate', dense, part-**Inf** with 2 - 3 **Fl**; **Fl** 20 - 29 mm.

According to the protologue closely related to *A. pendula*.

A. wercklei F. A. C. Weber *ex* Wercklé (Monatschr. Kakt.-kunde 17(5): 71-72, 1907). **T**: Costa Rica (*Wercklé* s.n. [US]). – **Lit**: Horich (1973); Ullrich (1992b); both with ill. **D**: Costa Rica; Pacific slopes, hot regions in sparse grassland. **I**: Gentry (1982: 502).

[2k] **Ros** compact, 1 - 2 m Ø, solitary; **L** variable, ovate to lanceolate, ascending to outcurved, thick and robust, broad, thickly fleshy, narrowed at the base, short-acuminate, tip inrolled, plane to concave towards the tip, young with rough surface below the tip, 70 - 150 cm, green to white glaucous, with impressions from the central bud, margins smoothly rounded, straight to undulate; marginal teeth deltoid, small, 3 - 4 mm, black; terminal **Sp** conical at the base tapering into an acicular point, narrowly

grooved above, 2 - 3 cm, dark brown or black, finely shortly decurrent; **Inf** 8 m, 'paniculate', large, profuse, part-**Inf** short, branched, umbellate, dense, ± 45 per **Inf**, bulbiferous; **Fl** 62 mm; **Ov** elongate, narrowed at both ends, 40 mm; **Tep** golden-yellow, tube openly funnel-shaped, 8 - 9 mm, lobes 17 mm.

The large thick leaves, the 'panicles' reaching deeply down the inflorescence axis, and the flowers point towards a relationship with *A. parvidentata* (Gentry 1982: 501). Ullrich (l.c.) clarified the correct author citation of the species.

A. willdingii Todaro (Hort. Bot. Panorm. 2: 36, t. 32, 1878). – **Lit:** Trelease (1913); Álvarez de Zayas (1985). **D:** Only known from cultivation; probably originating from Cuba.

[2m] **Ros** solitary; **L** rather few, broadly oblong-lanceolate, gradually acute, slightly concave and conduplicate, 60 - 80 $\times$ 15 cm, light green or slightly glaucous, margins slightly concave; marginal teeth variously curved, acuminate triangular or somewhat lenticular at the base and on green prominences, 1 - 3 mm, 1 - 1.5 cm apart; terminal **Sp** conical, slit-grooved below the middle, smooth, 1 - 1.5 cm, brown, dull, scarcely decurrent; **Inf** 4 - 5 m, 'paniculate', part-**Inf** few, very lax, on outcurved slender **Br** in the upper $\frac{1}{2}$ or more of the **Inf**; **Fl** 30 mm; **Ov** nearly cylindrical, 15 mm; **Tep** orange, tube openly conical, 4 mm, lobes 10 - 12 mm; **Fr** unknown.

Not definitely known as wild plant (Trelease 1913: 43), but possibly originating from Cuba, as indicated by the small orange-yellow flowers. According to Trelease to be compared with *A. antillarum*. The species epithet is variously spelled 'wildingii', 'willdingii' etc.

A. wocomahi Gentry (Publ. Carnegie Inst. Washington 527: 96, 1942). **T:** Mexico, Chihuahua (Gentry 1989 [CAS, ARIZ, DES]). – **Lit:** McVaugh (1989). **D:** Mexico (Sonora, Chihuahua, Sinaloa, Durango); rocky limestone mountain slopes in pine-oak forests, 1400 - 2500 m. **I:** Gentry (1982: 423, 457-458).

[2g] **Ros** 0.8 - 1.3 $\times$ 1.5 - 2 m, not suckering; **L** mostly lanceolate to linear-lanceolate, rarely ovate, ascending to depressed with age, rather rigid, somewhat narrowed towards the base, plane, 30 - 90 $\times$ 9 - 25 cm, dark to glaucous-green, margins straight to undulate; marginal teeth variously curved, below the middle of the lamina frequently down-curved, with smaller irregular intermittent teeth, larger teeth 1 - 2 cm, dark brown to glaucous-brown; terminal **Sp** stout, usually sinuous, flattened or with a broad groove, 3 - 6 cm, short- or long-decurrent; **Inf** 3 - 5 m, 'paniculate', open, part-**Inf** small, 8 - 15 in the upper $\frac{1}{2}$ of the **Inf**; **Fl** erect, 65 - 85 mm; **Ov** cylindrical, 34 - 40 mm incl. a 2 - 5 mm long neck, light green; **Tep** yellow, tube deeply funnel-shaped, 18 - 22 mm, lobes dimorphic, 15 - 23 mm.

Distinguished from *A. shrevei* by its dark green leaf colour and more remote teeth. Easily confused with *A. bovicornuta* (Group *Crenatae*) with lighter yellowish-green leaves conspicuously narrowed just above the base and with different flowers (Gentry 1982: 456).

A. xylonacantha Salm-Dyck (Bonplandia 7: 92, 1859). **T:** [neo - icono]: Curtis's Bot. Mag. 1867, t. 5660. – **D:** Mexico (Tamaulipas, San Luis Potosí, Guanajuato, Querétaro, Hidalgo); dry limestone slopes and valleys, > 900 m. **I:** Gentry (1982: 126, 186-187).

Incl. *Agave cornuta* Hort. Belg. ex Besaucèle (s.a.); **incl.** *Agave xylonacantha* var. *mediopicta* Trelease (s.a.); **incl.** *Agave maximiliana* hort. ex Besaucèle (s.a.) (*nom. illeg.*, Art. 53.1); **incl.** *Agave xylonacantha* var. *latifolia* Jacobi (s.a.) (*nom. inval.*, Art. 29.1?); **incl.** *Agave xylonacantha* var. *macracantha* Jacobi (s.a.) (*nom. inval.*, Art. 29.1?); **incl.** *Agave xylonacantha* var. *torta* Jacobi (s.a.) (*nom. inval.*, Art. 29.1?); **incl.** *Agave xylonacantha* var. *vittata* Jacobi (s.a.) (*nom. inval.*, Art. 29.1?); **incl.** *Agave vittata* Regel (1858); **incl.** *Agave amurensis* Jacobi (1864); **incl.** *Agave kochii* Jacobi (1866); **incl.** *Agave splendens* Jacobi (1870) $\equiv$ *Agave heteracantha* var. *splendens* (Jacobi) A. Terracciano (1885); **incl.** *Agave perbella* hort. ex Baker (1877); **incl.** *Agave vanderdonckii* hort. ex Baker (1877); **incl.** *Agave xylacantha* hort. (1877) (*nom. inval.*, Art. 61.1); **incl.** *Agave hybrida* hort. ex Baker (1887); **incl.** *Agave carchariodonta* Pampanini (1907) $\equiv$ *Agave univittata* var. *carchariodonta* (Pampanini) Breitung (1959); **incl.** *Agave noli-tangere* A. Berger (1915); **incl.** *Agave xylonacantha* var. *horizontalis* hort. ex A. Berger (1915).

[1g] Stem short; **Ros** openly spreading, solitary or caespitose; **L** ensiform-lanceolate, rather rigid, broadest in the middle, long-acuminate, rounded below, plane to concave above, 45 - 90 $\times$ 5 - 10 cm, green to yellowish-green, sometimes glaucous, with or without a pale mid-stripe, margins horny, continuous, straight between the remote conspicuous prominences but looping over the prominences; marginal teeth broadly flattened, thickly terminating the broad prominences, frequently 3- to 5-tipped, 8 - 15 mm, light grey, commonly 2 - 5 cm apart; terminal **Sp** trigonous-subulate, stout, 2.5 - 5 cm, light grey; **Inf** erect, 3 - 6 m, 'spicate', long tapering, flowering in the upper $\frac{1}{2}$ - $\frac{2}{3}$, part-**Inf** with 2 - 3 **Fl**; **Fl** 40 - 50 mm; **Ov** fusiform, 20 - 27 mm; **Tep** greenish to pale yellow, tube 3 - 5 mm, lobes $\pm$ equal, 15 - 20 mm. – *Cytology:* $2n = 60$.

Related to *A. lophantha*. The highly convoluted leaf margins with large flattened several-tipped teeth are like an exaggeration of the forms known from *A. lophantha* (Gentry 1982: 188).

A. zebra Gentry (US Dept. Agric. Handb. 399: 126-130, ill., 1972). **T:** Mexico, Sonora (Gentry

21984 [US]). – **Lit:** Turner & al. (1995). **D:** Mexico (Sonora: Sierra del Viejo, Cerro Quituni); limestone slopes, 700 - 1000 m. **I:** Gentry (1982: 508, 517-518). **Fig. VII.g**

[2j] **Ros** rather open, low-spreading, 0.4 - 0.6 × 1 - 1.6 m, mostly solitary; **L** lanceolate, arcuate, thick, rigid, narrowed above the base, broadest near the middle, deeply guttered, scabrous, 50 - 80 × 12 - 17 cm, light grey-glaucous, conspicuously cross-zoned, margins strongly undulate; marginal teeth variously curved, strong, flattened, large, mostly 1 - 2 cm (middle of the lamina), grey with chestnut-brown tips, 1 - 3 cm apart, bases broad, low, scabrous, on conspicuous prominences; terminal **Sp** acicular, mostly very narrowly grooved above, 3.5 - 7.5 cm, yellowish-brown to light grey, scabrously decurrent for 5 - 10 cm to the uppermost teeth; **Inf** 6 - 8 m, 'paniculate', narrow, part-**Inf** small, 7 - 14 in the upper 1/5 - 1/4 of the **Inf**; **Fl** small, 40 - 55 mm; **Ov** slender, 25 - 32 mm, neck slightly constricted, 6-sulcate; **Tep** yellow, tube funnel-shaped, 6 - 7 mm, lobes ± equal, 12 - 15 mm.

BESCHORNERIA

J. Thiede

Beschorneria Kunth (Enum. Pl. 5: 844, 1850). **T:** *Furcraea tubiflora* Kunth & Bouché. – **Lit:** García-Mendoza (1987). **D:** Mexico; dry rocky woodlands to cloud forests. **Etyim:** For Friedrich W. C. Beschorner (1806 - 1873), German physician and botanist, director of the Institute of Public Assistance and the Lunatic Asylum at Owinsk, Poland.

Mostly acaulescent or rarely caulescent-arborescent (*B. albiflora*) rhizomatous **Ros** plants, caespitose with age; **L** ± linear-lanceolate, narrowed at the base, base inflated to form a **L** sheath, lamina tough, carinate-canaliculate, glabrous, midrib fleshy, tip a long soft point, margins entire or minutely denticulate; **Inf** racemes or few-branched panicles, straight or arching over, scape and **Bra** red, pink or yellow; **Bra** broad and long, conspicuous, coloured; **Ped** present; **Fl** pendulous, actinomorphic, 2 - 5 together in remote fascicles; **Tep** lanceolate, free but connivent to form a tube-like structure, greenish, yellowish or red, apical part slightly spreading; **ITep** carinate on the outside, papillose or puberulous on the inside; **Fil** filiform, slightly thickened at the base, papillose, ± as long as the **Tep**; **Anth** ± oblong; pollen released in monads or tetrads; **Ov** inferior, oblong, trigonous, 6-sulcate, 3-locular; **Sty** filiform, papillose, as long as or exceeding the **St**, basally swollen into 3 ridges; **Sti** obscurely 3-lobed, ciliate; **Fr** ± cylindrical loculicidal capsules; **Se** plano-convex, flat, shining black to blackish. – **Cytology:** $x = 30$.

With its long and merely soft leaves and the inflorescences with large colourful bracts, the genus is atypical for the family and might be mistaken as

belonging to the *Bromeliaceae*, with some similarity to, e.g., *Billbergia*. García-Mendoza (1987) produced a full taxonomic revision of the genus, but this apparently remained unpublished.

In warmer regions, plants in good condition may flower each year from previous years' suckers, whereas flowering of greenhouse plants in northern regions may occur in long intervals only. The plants are just winterhardy in the warmest parts of the British Isles.

The following names are of unresolved application but are referred to this genus: *Beschorneria californica* hort. (s.a.) (*nom. inval.*, Art. 29.1); *Beschorneria dubia* Carrière (1877); *Beschorneria galeottii* Jacobi (1864); *Beschorneria glauca* hort. ex W. Watson (1889); *Beschorneria multiflora* hort. ex K. Koch (1859); *Beschorneria parmentieri* Jacobi (1864); *Beschorneria pumila* Jacobi (1864); *Beschorneria schlechtendalii* Jacobi (1864); *Beschorneria superba* Hort. Hamburg ex Baker (1888); *Beschorneria verlindeniana* Jacobi (1864).

B. albiflora Matuda (Anales Inst. Biol. UNAM, Ser. Bot. 43(1): 51-55, 1974). **T:** Mexico (*MacDougall* 359-A [MEXU]). – **Lit:** Lott & García-Mendoza (1994). **D:** Mexico (Oaxaca, Chiapas), Guatemala; evergreen forest or scrub.

Incl. *Beschorneria chiapensis* Matuda (1986) (*nom. inval.*, Art. 32.1c).

Caulescent-arborescent, stems 0.5 - 3 (-8) m, erect, sometimes prostrate; **L** erect, gradually narrowed towards the base, chartaceous, 60 - 90 (-125) × 5.5 - 7 (-10) cm, green-glaucous, tip not hardened, margins entire, rarely denticulate; **Inf** open, 1.5 - 2.5 m; scape red; **Bra** red; **Ped** 10 - 35 mm; **Fl** (50-) 60 - 85 mm, 2 - 4 grouped together; **Tep** linear-spatulate to linear-oblong, 25 - 35 (-45) × 2 - 5 mm, connivent, tips slightly spreading, red; **St** as long as the **Tep**; **Anth** 5 - 7 mm; **Ov** 25 - 40 × 3 - 6 mm, intensely red; **Fr** 50 - 70 × 20 - 30 mm. – **Cytology:** $2n = 60$.

This is the only arborescent species in the genus. All others with the exception of the short-stemmed *B. wrightii* and *B. tubiflora* are acaulescent. – *B. chiapensis* appears to belong here.

B. calcicola García-Mendoza (Herbertia, ser. 3, 42: 28-30, ill., 1986). **T:** Mexico, Oaxaca (*García-Mendoza & Lorence* 720 [MEXU, ENCB]). – **D:** Mexico (SE Puebla, NW Oaxaca, Veracruz); limestone rocks, 1900 - 2400 m, flowering May to August / September.

Acaulescent; **Ros** dense; **L** erect or sometimes ± recurved, linear, conduplicate, rigid, upper face scabrous and carinate, lower face somewhat rough, 30 - 50 × 0.3 - 0.6 cm, glaucous (drying greenish-yellow), **L** sheath triangular, 4 - 6 × 1.5 - 2 cm, yellowish, **L** margins denticulate; **Inf** racemose, 1.15 - 2.3 m, with 16 - 30 **Fl**, scape 0.8 - 1 m, pinkish or yellow.

wish; scape **Bra** 7 - 13, pink; floral **Bra** 10 - 17, pinkish to scarious; **Ped** 0.7 - 2 cm, articulate at the tip; **Fl** pendulous, (35-) 40 - 50 mm, 1 - 2 (-3) grouped together; **Tep** linear to linear-spatulate, (20-) 25 - 33 × 2 - 5 mm, outside puberulent, inside papillose, with a conspicuous midrib, connivent to form a tubular structure with only the tips spreading, tips and inside white, outside pink or yellowish; **Fil** subulate, dilated at the base for 1 - 1.5 mm, papillose; **Anth** linear-oblong, 3 - 6 mm, pale green; **Ov** oblong to subglobose, 6-angled, puberulous, 13 - 20 × 2 - 4 mm, pinkish or yellowish; **Sty** exceeding the **St**, sometimes exceeding the **Tep**, papillose; **Fr** erect, subglobose, 20 - 28 × 15 - 18 mm; **Se** 5 - 7 × 4 - 5 mm, shiny black.

Most closely allied to *B. tubiflora* according to the protologue.

B. rigida Rose (CUSNH 12: 262, 1902). **T:** Mexico, San Luis Potosí (*Palmer* 593 [US 570098]). – **D:** Mexico (Guanajuato, Puebla, San Luis Potosí, Tamaulipas).

Acaulescent; **L** numerous, erect, rather rigid, roughened on both faces, 30 × ≤ 2 cm, narrowing into a long-acuminate tip; **Inf** ± 1 m; **Bra** large, 15 - 20 cm, purplish; **Fl** 45 mm, in groups of 2 - 4; **Tep** somewhat scabrous, dull, usually greenish-yellow; **St** shorter than the **Tep**; **Fr** oblong, 3 cm; **Se** black.

Insufficiently known. According to the protologue, this taxon was first regarded as belonging to *B. tubiflora*, but differs in its narrower erect leaves, which are rough on both faces, and more numerous dull flowers.

B. septentrionalis García-Mendoza (Cact. Suc. Mex. 33(1): 3-5, ill., (2): 52 [erratum], 1988). **T:** Mexico, Tamaulipas (*García-Mendoza & Ramos* 2903 [MEXU]). – **D:** Mexico (Tamaulipas); cloud forest, above 1400 m.

Acaulescent, rhizomatous; **Ros** caespitose; **L** 10 - 20, recurved, oblanceolate, basis dilated, glabrous on both faces, 70 - 90 (-105) × (5-) 6 - 9 (-13) cm, 1.8 - 2.5 (-3.3) cm broad at the basal constriction, brilliant green, tip shortly acuminate, margins finely denticulate with 1 - 3 (-4) denticles per mm; **Inf** cymose-paniculate, 1.5 - 2.5 m, with 4 - 7 part-**Inf** 9 - 25 (-50) cm long, overall with 90 - 130 **Fl**; scape carmine-red; scape **Bra** 4 - 5, oblanceolate, to 30 cm, carmine-red; floral **Bra** 12 - 30, lanceolate to deltoid, reddish to translucent; **Ped** (1-) 3.5 - 4.5 (-6) cm; **Fl** (50-) 55 - 60 (-65) mm, 2 - 4 grouped together; **Tep** linear-oblong to oblong-spatulate, inside papillose, outside glabrous, 25 - 30 × 2 - 8 mm, carmine-red, tip and margins yellowish; **Fil** subulate, papillose, 2 - 4 mm shorter than the **Tep**; **Anth** oblong-elliptic, 5 - 7 mm; **Ov** slightly 6-sulcate, 25 - 30 (-33) × 2 - 8 mm, carmine-red; **Fr** ovate, 35 - 50 (-65) × 25 - 35 mm, green; **Se** shining black.

Closest to *B. yuccoides* according to the protologue.

B. tubiflora (Kunth & Bouché) Kunth (Enum. Pl. 5: 844, 1850). – **D:** Mexico (San Luis Potosí, Hidalgo); pine-oak forest.

≡ *Furcraea tubiflora* Kunth & Bouché (1847); **incl.** *Beschorneria toneliana* Jacobi (s.a.); **incl.** *Beschorneria tonelii* Jacobi (1874).

Acaulescent or short-stemmed; **Ros** with 12 - 20 **L**; **L** tufted, ± recurved, linear, thickened and triangular at the base, ± contracted into a flat and thick pseudopetiole below the middle, long- or short-acuminate, scabrous on both faces, with fine longitudinal stripes, ± 30 - 60 × 2.5 - 5 (-6.25) cm, glaucous-green to very glaucous, margins denticulate; **Inf** ± 1 - 1.2 m, scape bright red-purple, terminating in an erect simple raceme, **Br** drooping (?); **Bra** lanceolate, to 12, purple-red; **Fl** pendulous, 2 - 4 together; **Tep** free, to 25 mm, longer than the **St**, reddish-green or brownish-green or purple and red, glabrous on the outer face; **Ov** to 13 mm; **Fr** not known. – *Cytology*: 2n = 60.

The report of *B. tonelii* for Chiapas (Breedlove 1986) most certainly represents a misidentification for *B. albiflora*.

B. wrightii Hooker fil. (CBM 127: t. 7779 + text, 1901). – **D:** Mexico (México).

Incl. *Beschorneria pubescens* A. Berger (1906).

Stems to ± 45 cm; **Ros** with ± 50 **L**; **L** large, densely crowded, spreading or recurved, ensiform, rather stiff and fleshy along the midrib, 60 - 150 × 5 cm, glaucous, nearly smooth below, rough only near the tip, base broadened, very thick and biconvex, tip narrowed into a long brown stiff point, margins very narrowly scarious, finely and deeply denticulate; **Inf** 1.2 - 2 m, pyramidal, rather slender, richly branched, scape bright red, tall; **Bra** ovate; **Fl** in fascicles; **Tep** greenish, fading to yellow, (weakly) pubescent.

Allied to *B. yuccoides* ssp. *dekosteriana* according to Oliver & Bailey (1927).

B. yuccoides K. Koch (Wochenschr. Gärtnerei Pflanzenk. 2: 337, 1859). – **D:** Mexico (Hidalgo, Puebla, Veracruz); 2700 - 3000 m.

B. yuccoides ssp. *dekosteriana* (K. Koch) García-Mendoza (Monocot. Mexic. Syn. Florist. 1(1): 30, 1993). – **D:** Mexico (Hidalgo, Puebla, Veracruz).

≡ *Beschorneria dekosteriana* K. Koch (1864); **incl.** *Beschorneria decosteriana* Baker (1883) (*nom. inval.*, Art. 61.1); **incl.** *Beschorneria argyrophylla* hort. ex W. Watson (1889) (*nom. inval.*, Art. 32.1c).

Differs from ssp. *yuccoides*: **Ros** with 15 - 20 **L** or more; **L** long acuminate, tapering very gradually from the middle towards both ends, ± 60 × 6 - 7.5 cm, light grey, glaucous; **Inf** scape light brown; **Fl** pendulous, ± 38 mm; **Fr** clavate.

The name was first used by García-Mendoza (1987) in his unpublished revision of the genus, but the combination was only validated in 1993.

B. yuccoides ssp. **yuccoides** – **D:** Mexico (Hidalgo); 2700 - 3000 m. **I:** Matuda (1967: as *B. hidalgorupicola*); Eggli (1994: 87, as *B. bracteata*). **Fig. VIII.a, VIII.b**

Incl. *Beschorneria bracteata* Jacobi ex Baker (1864); **incl.** *Beschorneria viridiflora* Hort. Hamburg ex Anonymus (1892); **incl.** *Beschorneria hidalgorupicola* Matuda (1967).

Acaulescent; **L** 20 - 35, erect, linear-lanceolate, base broadened, then narrowed to 1.25 cm above the base, attenuate, (sub-) coriaceous, upper face glabrous, lower face scabrous, 40 - 60 (-90) × 3.3 - 3.5 (-10) cm, grey-green to green, glaucous, tip acuminate, margins finely denticulate; **Inf** 1 - 1.8 (-3.2) m, scape dark red, tip overhanging at first, later erect, part-**Inf** in the upper ⅓, up to 20 and up to 30 cm long, drooping, red to reddish brown; **Bra** red; **Ped** short, 0.4 - 3.5 (-30) mm; **Fl** 40 - 50 mm, glabrous to glabrescent; **Tep** linear-oblong, oblong or spatulate, acute, 33 - 40 × 3.5 - 7 mm, free but narrowly connivent to form a tube-like structure, red or green-yellowish and with reddish tinge, tip green, upper ± 10 mm somewhat spreading and slightly pilose; **Fil** filiform, 35 mm, included; **Anth** 3.5 - 6 mm; **Ov** cylindrical, 20 × 5 mm, dark red, neck slightly constricted; **Sty** filiform; **Sti** slightly pilose; **Fr** oblong to subglobose, 30 - 40 × 15 - 25 mm; **Se** flat, 7 - 8 × 3.5 - 5 mm, black. – *Cytology:* 2n = 60.

Differs from *B. tubiflora* by the broader and shorter acuminate leaves, which narrow more prominently below the middle (Oliver & Bailey 1927). *B. hidalgorupicola* is included in the synonymy here following Galván Villanueva (1990). This is the only taxon of the genus more often seen in cultivation. The plant is hardly outdoors in the Mediterranean or even in S England (Ullrich 1991e).

FURCRAEA

J. Thiede

Furcraea Ventenat (Bull. Sci. Soc. Philom. Paris 1: 65, 1793). **T:** *Agave cubensis* Jacquin [Lectotype, designated by Britton, Fl. Bermuda, 80, 1918 (fide ING).]. – **Lit:** Drummond (1907); Trelease (1910); Trelease (1915a); Trelease (1915b); Trelease (1920); Lott & García-Mendoza (1994); Álvarez de Zayas (1996a). **D:** C and S Mexico, C America to Panama, Caribbean Region, Colombia, Venezuela, Peru, Bolivia, Brazil, Paraguay (the S American range apart from Colombia, Peru and Bolivia, as well as major parts of the Caribbean distribution might be exclusively anthropogenic). **Etym:** For Antoine F. de Fourcroy (1755 - 1809), French politician and chemist, 1784 director at the Jardin des Plantes in Paris.

Incl. *Fourcroya* Haworth (nom. inval., Art. 61.1).

Incl. *Roezlia* hort. non Regel (nom. inval., Art. 29.1).

Incl. *Funium* Willemet (1796). **T:** *Funium pitiferum* Willemet.

Incl. *Furcroea* De Candolle (1806) (nom. inval., Art. 61.1).

Incl. *Furcroya* Rafinesque (1814) (nom. inval., Art. 61.1).

Incl. *Fourcroya* Sprengel (1817) (nom. inval., Art. 61.1).

Plants strictly monocarpic; stem none or a thick trunk to 6 m; **L** densely crowded, large, lanceolate, long and narrow, thin and flexible or rather thick and stiff, tip a short firm point, margins entire, denticulate or coarsely toothed; **Inf** tall lax terminal panicles to 13 m, part-**Inf** on long lateral **Br**, often bulbiferous; **Fl** pendulous, bracteate, pedicellate, solitary or fasciculate in groups of 2 - 5, often all or in part replaced by bulbils; **Tep** principally equal but **ITep** often (generally?) ± larger, ovate-oblong, almost free to the base, white or greenish-white; **Fil** 3 + 3, shorter than the **Tep** and affixed to their bases, dilated below the middle, subulate distally, included; **Anth** linear-oblong, dorsifixed; **Ov** inferior, oblong, usually shortly rostrate at the tip; **Sty** columnar, swollen into 3 basal ridges; **Sti** small, capitate or shortly trilobate; **Fr** oblong or ovoid loculicidal 3-valvate capsules; **Se** flattened, black.

The genus is in urgent need of a critical revision and embraces many ill-known taxa of uncertain circumscription. Some species recognized may merely represent early anthropogenic selections, cultivars or hybrids. With a maximum length of 13 m (Verhoek-Williams 1998), the genus apparently has the largest inflorescences of any plant.

Ullrich (1991h) regards the publication of the generic name *Furcraea* as cited above as not effectively published under Art. 29.1 of the ICBN, since printed material was distributed only to correspondents of the "Société Philomatique" and not to the 'general public'. According to Ullrich, the name was only effectively published in the reprint of 1802, and so becomes antedated by *Funium* Willemet. Ullrich's interpretation is, however, not followed here, since distribution to correspondents of a society complies with the provisions of Art. 29.1 (if not, numerous periodicals published by societies would have to be regarded as 'not effectively published').

Furcraea can (possibly artificially) be divided as follows:

- [1] Sect. *Furcraea* (incl. Sect. *Spinosa* Drummond 1907, nom. inval., Art. 22.2): Stems none or short and < 2 m; **L** firm-textured, green or a little glaucous, not striate, margins with conspicuous ± distant teeth (occasionally teeth few or absent; **Bra** much shorter than the **Ped**. – Possibly a paraphyletic hold-all.
- [2] Sect. *Serrulatae* Drummond 1907 (incl. Subgen. *Roezlia* Baker 1888; incl. Ser. *Flexiles* Baker 1879): Stems conspicuous, plants sometimes arborescent; **L** flexible, glaucous, striately rou-

ghened, margins closely beset with minute denticles; **Inf** pubescent; **Bra** much longer than the **Ped**.

The following names are of unresolved application but are referred to this genus: *Agave aspera* Jacquin (1762) $\equiv$ *Furcraea aspera* (Jacquin) M. Roemer (1847); *Agave noackii* Jacobi (1865) $\equiv$ *Furcraea noackii* (Jacobi) hort. ex Baker (1877); *Agave stenophylla* Jacobi (1866); *Agave vivipara* Miller (1768) (*nom. illeg.*, Art. 53.1); *Agave vivipara* Willdenow (1799) (*nom. illeg.*, Art. 53.1); *Agave vivipara* Arruda da Câmara (1810) (*nom. illeg.*, Art. 53.1); *Furcraea agavephylla* Brotero ex Schultes (1829); *Furcraea aitonii* Jacobi (1869); *Furcraea albispina* Hort. Panorm. ex Baker (1893); *Furcraea altissima* Todaro ex Franceschi (1900); *Furcraea atroviridis* Jacobi & Goeppert (1866); *Furcraea cubensis* Haworth (1819) (*nom. illeg.*, Art. 53.1) $\equiv$ *Agave cubensis* (Haworth) Sprengel (1825) (*nom. illeg.*, Art. 53.1); *Furcraea cubensis* var. *inermis* Baker (1881); *Furcraea demouliniana* Jacobi (1867); *Furcraea depauperata* Jacobi (1866); *Furcraea elegans* Todaro (1876); *Furcraea ghiesbreghtii* hort. ex Jacobi (1867); *Furcraea lipsiensis* Jacobi (1869); *Furcraea macra* Hort. Parmentier ex Jacobi (1866); *Furcraea pugioniformis* Hort. Verschaffelt ex Todaro (1876); *Furcraea rigida* Landry ex Jacobi (1867) (*nom. illeg.*, Art. 53.1); *Furcraea roezlii* Eichler (1881); *Furcraea roezlii* var. *atropurpurea* Hort. De Smet (1876); *Furcraea sobolifera* Hort. Cels ex Jacobi (1867); *Furcraea stricta* Jacobi (1867); *Furcraea valleculata* Jacobi (1867).

F. acaulis (Kunth) B. Ullrich (Quepo 6: 69, 1992). – **D:** Peru. **I:** Ullrich (1992h: as *F. humboldtiana*).

$\equiv$ *Yucca acaulis* Kunth (1816); **incl.** *Furcraea humboldtiana* Trelease (1910).

[1] **Ros** acaulescent or with a stem finally reaching 3 m; **L** spreading, lanceolate-ensiform, almost flat, smooth, ± 1.5 m $\times$ 12.5 - 15 cm, marginal teeth bifid, reflexed, 3 - 5 mm, usually in divergent pairs from the tops of green prominences, 25 - 62 mm apart, but toothless forms also known; **Inf** 7.2 - 9 (-12) m with a long scape; **Fl** pendent, ± 50 - 62 mm; **Tep** oblong, 32 - 38 mm, $\pm$ obtuse, light yellow, **ITep** slightly broader; **Ov** triquetrous, ± 20 - 25 mm; **Sty** triquetrous; **Sti** trifold.

Insufficiently known. See also under *F. tuberosa*.

F. andina Trelease (in L. H. Bailey, Stand. Cycl. Hort. 3: 1305, 1915). **T:** Peru (*Furlong* s.n. [MO]). – **Lit:** Ullrich (1992h: with ills.). **D:** Peru (Ancash, Cuzco, Huanuco, Junín, La Libertad, Lima); Andean grasslands, 1500 - 3500 m. **I:** Rauh (1958: 142, identification uncertain).

Incl. *Furcraea deledevantii* Rivière (1902); **incl.** *Furcraea delevantii* Rivière (1902) (*nom. inval.*, Art. 61.1); **incl.** *Furcraea altissima* hort. ex Trelease (1915) (*nom. illeg.*, Art. 53.1).

[1] **Ros** acaulescent; **L** large, oblong-lanceolate, marginal teeth prominent, curved, remote, normally reaching 6 mm or more, almost as large as distant; **Inf** short-stalked, bulbiferous, bulbils conical-ovoid; **Fr** cuboid.

Insufficiently known. Trelease (1915a) includes the prioritable name *F. deledevantii* here, which is followed by Macbride (1936) and Brako & Zaruch (1993).

F. antillana A. Álvarez (Anales Inst. Biol. UNAM, Ser. Bot. 67(2): 331-335, ills., 1996). **T:** Cuba, La Habana (Álvarez 63654 [HAJB]). – **D:** Greater Antilles: Cuba, Hispaniola, Puerto Rico; mainly semi-deciduous forests or dry coastal scrub, flowers July to September.

[1] Stems short, to 50 cm, not rhizomatous; **L** numerous, 90 - 110, straight, narrowly lanceolate, nearly plane to slightly canaliculate, slightly folded towards the tip, rigidly coriaceous, often asperous, (0.6-) 0.9 - 1.2 (-2) m $\times$ 5 - 10 cm, light green to somewhat yellowish, opaque, margins straight between the teeth, marginal teeth triangular, straight or normally somewhat reflexed, 2 - 5 (-7) mm, chestnut-brown to nearly black, on deltoid prominences, decurrent, 2 - 5 cm (0.4 - 2 cm at the base) apart, sometimes lacking in the upper $\frac{1}{3}$ of the **L**, **L** tip acute, not or inconspicuously mucronate; **Inf** 4 - 6 (-8) m, narrowly fusiform, part-**Inf** (20-) 40 - 70 (-90) cm, ascending in the upper $\frac{2}{3}$ of the **Inf**, bulbiferous, bulbils narrowly fusiform; **Fl** 2 - 3 grouped together; **Ped** 4 - 10 mm; **Fl** pendent, campanulate, (25-) 32 - 40 mm; **Tep** elliptic, (12-) 14 - 19 (-27) $\times$ 5 - 8 mm, whitish, outside greenish; **Fil** 10 - 20 mm; **Ov** triquetrous, (13-) 18 - 20 mm; **Sty** 10 - 20 mm; **Fr** oblong, beaked, 2.5 - 5 $\times$ 1.6 - 3 cm.

Variable in leaf and flower characters according to the protologue, esp. as influenced by different edaphic conditions.

F. bedinghausii Koch (Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 6(30): 233-235, 1863). **T:** [lecto - icono]: Belg. Hort. 13(11): t. ad p. 327, 1863. – **Lit:** McVaugh (1989: with ill.); Ullrich (1991i). **D:** Mexico (Jalisco, Distrito Federal, Hidalgo, Michoacán, México); mountain slopes and summits, 2650 - 3500 m. **I:** Matuda (1961: 69-70); Benítez B. (1986: 62). **Fig. VIII.c**

$\equiv$ *Furcraea longaeve* ssp. *bedinghausii* (Koch) B. Ullrich (1991) (*nom. inval.*, Art. 33.2); **incl.** *Furcraea flaccida* Hort. Panorm. ex Hort. Kew (s.a.); **incl.** *Yucca parmentieri* Ortgies (1859); **incl.** *Agave argyrophylla* hort. ex Koch (1862); **incl.** *Agave toneliana* Hort. ex Morren (1863); **incl.** *Roezlia regia* Hort. ex Lemaire (1863); **incl.** *Yucca argyrophylla* Hort. ex Lemaire (1863); **incl.** *Yucca toneliana* hort. ex Koch (1863); **incl.** *Beschorneria multiflora* hort. ex C. Koch (1863) (*nom. illeg.*, Art. 53.1); **incl.** *Roezlia bulbifera* Roezli (1881); **incl.** *Furcraea*

roezlii André (1887) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca pringlei* Greenman (1898).

[2] Stems erect, thick, to 5 - 8 × 0.3 - 0.4 m; **Ros** 2 - 3 m Ø; **L** first ascending-spreading, later spreading to pendent, forming a dry skirt below the **Ros**, lanceolate, stiff, ensiform, narrowed below the middle, long-attenuate to a subulate (but not spiny) tip, flat to concave or plicate, upper face striate and roughened by projections from the longitudinal veins, (35-) 70 - 120 × (4-) 6 - 10 (in the middle) cm, green, somewhat glaucous, marginal teeth minute, irregularly spaced, pale, deltoid, ± 2 teeth per mm; **Inf** erect, pyramidal, (2.5-) 4 - 5 (-8) × up to 2 m, pubescent, part-**Inf** 30 - 65 (-100) cm, freely bulbilliferous, bulbils elongate; scape 0.5 - 1.5 m; **Ped** 3 - 5 mm; **Fl** 40 mm, 2 - 4 grouped together; **Tep** elliptic or oblong-elliptic, 18 - 20 × 5 - 7 mm, greenish-white, outside pilose; **Fr** oblong-ovoid, apiculate, 4 - 7 × ± 3 cm; **Se** 10 - 12 × 6 - 8 mm.

Ullrich (1991i) suggested subspecific rank under *F. longaeva*, to which *F. bedinghausii* appears to be closely related.

F. boliviensis Ravenna (Pl. Life 34: 151-153, ill., 1978). **T:** Bolivia, Mizque (Ravenna 2305 [Herb. Ravenna]). – **D:** Bolivia (Mizque); rocky slopes, 2600 - 3500 m, infrequent.

[1] Stems short, stout, sometimes prostrate, 30 - 40 × 10 - 15 cm; **Ros** 0.9 - 1 (incl. stem) × 1 - 1.4 m; **L** often spreading, ensiform, thick, rigid, slightly narrowed near the base, moderately channelled, up to 45 - 55 (rarely more) × 8 - 10 cm, opaquely ash-green, terminal **Sp** none but **L** tip an acute pungent point, marginal teeth small, uncinat, not exceeding 3 mm in length, rather close together; **Inf** unknown.

According to the protologue related to the Mexican *F. pubescens* (?= *F. undulata*; doubtful and no arguments given) and the Peruvian *F. andina*. *F. boliviensis* is the only native Bolivian species; other species reported for Bolivia (*F. occidentalis* aff., *F. foetida*) appear to represent garden escapes (Ravenna l.c.).

F. cabuya Trelease (Ann. Jard. Bot. Buitenzorg 3(Suppl. 2): 906, t. 36, 45, 1910). **T:** Costa Rica (Worthen & Dewey s.n. [ILL]). – **D:** SE Mexico, C America.

F. cabuya var. **cabuya** – **D:** Mexico (Yucatán), Honduras, Nicaragua, Costa Rica, Panama (cultivated only); thorn forests, savannas and pine forests, (50-) 300 - 1400 m, frequently (or exclusively?) cultivated. **I:** Berry (1995).

[1] **Ros** subcaulescent to caulescent, stems to 1 m, covered with old **L**; **L** lanceolate, abruptly narrowed above the base, openly concave, acute, semi-succulent, coriaceous, 1.5 - 2 m × 14 - 22 cm, green, young glaucous, margins straight between the teeth, marginal teeth deltoid, strong, normally antrorse, 5 - 8 (-11) mm, yellowish to chestnut-brown, decur-

rent, 2.5 - 4.5 (-5) cm apart, along the whole margin, **L** tip with a conical **Sp** 1 - 3 (-5) × 1 - 1.3 mm, reddish or dark chestnut-brown; **Inf** 5 - 10 m, part-**Inf** to 1 m, finely puberulent to glabrous, sometimes bulbilliferous, bulbils elongated; scape long; **Bra** much shorter than the **Ped**; **Ped** glabrous, 3 - 6 (-12) mm; **Fl** (45-) 55 - 62 mm, 3 - 6 grouped together; **Tep** elliptic, overlapping parts papillose, (26-) 30 - 36 × (8-) 11 - 15 mm, light green to yellowish-green; **ITep** broader, 13 - 18 mm broad; **Fil** 11 - 16 mm; **Ov** 23 - 28 mm; **Sty** 16 - 22 mm; **Fr** unknown.

F. cabuya var. **integra** Trelease (Ann. Jard. Bot. Buitenzorg 3(Suppl. 2): 907, 1910). **T:** Costa Rica (Worthen s.n. [ILL?]). – **Lit:** Lott & García-Mendoza (1994). **D:** Costa Rica, Panama; 100 - 600 m, cultivated only.

[1] Differs from var. *cabuya*: **L** normally completely without marginal teeth, or rarely with some teeth near the **L** base, 2 - 3 (-6) mm, terminal **Sp** normally absent, or 2 × 0.7 mm; **Fl** (37-) 45 - 52 mm; **Tep** narrowly elliptic to elliptic, (22-) 25 - 28 × 7 - 14 mm; **Fil** 10 - 14 mm; **Ov** 20 - 25 mm; **Sty** 14 - 19 mm; **Fr** oblong to subquadrangular, 6 × 4.5 cm.

Appears to represent merely an unarmed selection with smaller flowers.

F. cahum Trelease (Ann. Jard. Bot. Buitenzorg 3(Suppl. 2): 908, 1910). **T** [lecto]: Mexico, Yucatán (*Schott* 809 [F]). – **D:** Mexico (Campeche, Quintana Roo, Yucatán); tropical semideciduous forests, to 100 m.

[1] **Ros** shortly caulescent, stem to 1 m; **L** ensiform, narrowed to 2.5 - 3.5 cm above the base, broadly acuminate, plane, 1.6 - 2.1 (-2.4) m × 6.5 - 9 cm, brilliant green, margins ± straight between the teeth, marginal teeth antrorse or straight, 2 - 4 mm, reddish to black, 2 - 4 (-5) cm apart, decurrent over the slightly deltoid base, terminal **Sp** 2 - 6 × 1.5 - 2.5 mm; **Inf** 4 - 5 m, **Br** and **Fl** minutely papillose-puberulent, richly bulbilliferous; scape long; **Bra** much shorter than the **Ped**; **Ped** 4 - 6 (-10) mm, puberulent; **Fl** 40 - 45 (-50) mm, 2 - 4 grouped together; **Tep** elliptic, 20 - 25 × 9 - 12 mm, yellowish-green; **Fil** 10 - 14 mm; **Ov** 20 - 27 mm; **Fr** 5 × 3 - 3.5 cm; **Se** 9 - 12 × 5 - 8 mm.

Cultivated for fibres, and possibly not distinct from *F. hexapetala* (Lott & García-Mendoza 1994).

F. foetida (Linné) Haworth (Synops. Pl. Succ., 73, 1812). **T:** [icono]: Plukenet, Almag. t. 258: fig. 2, 1700. – **Lit:** Lott & García-Mendoza (1994). **D:** C America?, Greater and Lesser Antilles, Trinidad, N South America (mainly or exclusively cultivated); widely cultivated in Africa and Asia.

≡ *Agave foetida* Linné (1753); **incl.** *Furcraea gigantea* var. *medio-picta* Trelease (s.a.); **incl.** *Agave foetida* Aublet (1775) (*nom. illeg.*, Art. 53.1); **incl.** *Agave foetida* Lamarck (1784) (*nom. illeg.*, Art.

53.1); **incl.** *Furcraea gigantea* Ventenat (1793) $\equiv$ *Agave gigantea* (Ventenat) D. Dietrich (1840) (*nom. illeg.*, Art. 53.1); **incl.** *Funium piliferum* Willemet (1796); **incl.** *Furcraea madagascariensis* Haworth (1819) $\equiv$ *Agave madagascariensis* (Haworth) Salm-Dyck (1822); **incl.** *Agave commelynii* Salm-Dyck (1834) $\equiv$ *Furcraea commelynii* (Salm-Dyck) Kunth (1850); **incl.** *Furcraea gigantea* var. *willmetiana* M. Roemer (1847); **incl.** *Furcraea tuberosa* Hasskarl (1856) (*nom. illeg.*, Art. 53.1); **incl.** *Furcraea tuberosa* Hort. Belg. (1860) (*nom. illeg.*, Art. 53.1); **incl.** *Furcraea barrillettii* Jacobi (1869); **incl.** *Furcraea viridis* Hemsley (1885); **incl.** *Furcraea watsoniana* Hort. Sander (1898) $\equiv$ *Furcraea gigantea* var. *watsoniana* (Hort. Sander) Drummond (1907); **incl.** *Furcraea variegata* hort. ex Trelease (1915).

[1] Stems none or short; **L** broad, obovate-lanceolate, $\pm$ flat, undulate, somewhat asperous below, 1.5 - 2.5 m $\times$ 18 - 25 cm, fresh bright green, margins entire, somewhat wavy, basally with a few trigonous hooked teeth, otherwise teeth absent; **Inf** to 8 - 10 m, rather narrow, scape long, richly branched, scarcely to freely bulbilliferous, bulbils short; **Fl** 40 - 50 mm; **Tep** equalling the **Ov**, 20 - 25 mm, greenish-white; **Ov** 20 - 25 mm.

At present not reliably known from Mesoamerica (Lott & García-Mendoza 1994).

F. guatemalensis Trelease (Trans. Acad. Sci. St. Louis 23(3): 149, t. 32, 1915). **T:** Guatemala (*Trelease* 23 [ILL]). – **Lit:** Lott & García-Mendoza (1994). **D:** Guatemala, Belize, Honduras, El Salvador; rocky slopes in pine-oak forest, 700 - 2300 m.

incl. *Furcraea melanodonta* Trelease (1915).

[1] **Ros** subcaulescent; **L** (narrowly) lanceolate to typically almost ensiform, moderately concave, acute, smooth or slightly roughened, 1.3 - 2 (-2.25) m $\times$ 7 - 10 (-15) cm, opaque green to grey, tip with a robust **Sp**, subulate, grooved at the base, 2 $\times$ 1 mm, margins somewhat outcurved, straight between the prominences, marginal teeth (strongly) upcurved, decurrent on moderate fleshy elevations, 3 - 5 (-7) mm, 10 - 30 (-45) mm apart, red-brown, at first pale at the base, later becoming chestnut-brown; **Inf** glabrous, open, 2 - 5 m, bulbilliferous, bulbils ovoid-globose, without a leafy tuft; **Bra** much shorter than the **Ped**; **Fl** 40 - 45 mm; **Tep** oblong-elliptic, 20 $\times$ 6 - 11 mm, pale green or greenish-white; **Fil** 10 - 12 mm; **Ov** 15 - 20 mm; **Fr** globose-cuboidal, stipitate, beaked, 4 - 5 $\times$ 3.5 - 4 cm; **Se** 20 $\times$ 12 - 20 mm.

Plants from Mexico (Chiapas) placed here by Lott & García-Mendoza (1994) may represent an undescribed species at present under study (García-Mendoza 1999).

F. guerrensis Matuda (Anales Inst. Biol. UNAM 36: 114, 1966). **T:** Mexico, Guerrero (*Kruse* 8 [MEXU]). – **Lit:** McVaugh (1989). **D:** Mexico

(Guerrero); oak forest, 500 m; only known from the type collection. **Fig. VIII.f**

[1] Stems none; **L** 25 - 35, narrowly ensiform, bases dilated, broadly acuminate, concave in the upper part, nearly plane in the lower part, to 1.5 - 1.75 m $\times$ 12 - 15 cm, dark green on both faces, marginal teeth incurved, deltoid, chestnut-brown, 1 - 2 cm apart, terminal **Sp** very small, hardly 1 - 1.5 mm, chestnut-brown; **Inf** erect, lax, 8 - 10 m; scape **Bra** distant; **Fl** pedicellate; **Tep** unequal, semirhomboid, greenish-yellow; **OTep** 30 - 35 $\times$ 12 mm; **ITep** 35 $\times$ 20 mm; **Fil** basally dilated, 15 mm; **Anth** oblong, 7 mm; **Sty** columnar; **Sti** hardly capitate.

Closely related to *F. guatemalensis*, but distinguished by its much shorter leaves, the columnar (instead of triquetrous) style and incurved instead of straight marginal teeth (Matuda l.c.). McVaugh (1989) depicts and describes a plant from S Nayarit, Jalisco, Colima and México possibly belonging here.

F. hexapetala (Jacquin) Urban (Symb. Antill., 4: 152, 1903). **T:** Cuba, La Habana (*Jacquin* s.n. [BM]). – **Lit:** Álvarez de Zayas (1996a: with ills.). **D:** Bahamas, Greater Antilles (W Cuba, Jamaica, Hispaniola); semideciduous forests and xeromorphic scrub, esp. abundant on anthropogenic sites, to 750 (-1250) m, flowers September to January.

$\equiv$ *Agave hexapetala* Jacquin (1760); **incl.** *Agave odorata* Persoon (s.a.); **incl.** *Agave cubensis* Jacquin (1763) $\equiv$ *Furcraea cubensis* (Jacquin) Ventenat (1793) $\equiv$ *Furcroya cubensis* (Jacquin) Ventenat (1796) (*incorrect name*, Art. 11.3); **incl.** *Furcraea macrophylla* Baker (1899).

[1] Stems thick, to 1 m tall, rhizomatous, sometimes with numerous basal offsets; **L** up to 80, straight, lanceolate, nearly plane in the centre, canaliculate towards the tip, slightly scabrous on the lower face, coriaceous, (1-) 1.15 - 1.75 (-2) m $\times$ 8 - 10 (-15) cm, bright green, **L** tip canaliculate, acute, inconspicuously mucronate, marginal teeth strongly upcurved, 6 - 11 mm, on deltoid bases, normally decurrent, 3 - 7 (-12) cm apart, yellowish to brownish; **Inf** to 8 (-10) m, broad, deltoid, part-**Inf** lax, in the upper $\frac{3}{4}$ of the **Inf**, to 1.6 m, pyramidally branched, bulbilliferous, bulbils ovoid, to 45 $\times$ 25 mm; **Ped** 4 - 10 mm; **Fl** solitary or clustered, pendulous, 2 - 4 grouped together, campanulate, (30-) 38 - 46 (-50) mm; **Tep** oblong, (17-) 21 - 25 (-30) $\times$ 6 - 10 mm, whitish; **Fil** 15 - 30 mm; **Ov** 17 - 21 mm; **Sty** 15 - 30 mm; **Fr** broadly oblong, base constricted and deeply sulcate, tip beaked, 3 - 5 $\times$ 2.5 - 4 cm; **Se** numerous, flat, 12 - 14 $\times$ 4 - 6 mm.

See note under *F. cahum*.

F. longaeva Karwinsky & Zuccarini (Flora 15: 2 (Beiblatt 2): 94-95, 1832). **T:** [icon]: Acta Acad. Leop.-Carol. Nat. Cur. 16(2): 666-668, t. 48, 1833. – **Lit:** Trelease (1915b: with ills.); Ullrich (1991i: with ills.). **D:** Mexico (Guerrero, Oaxaca, Puebla).

Incl. *Beschorneria floribunda* hort. ex Koch (1862); **incl.** *Furcraea longa* J. J. Smith (1897) (*nom. illeg.*, Art. 52.1?).

[2] **Ros** caulescent, stems tall, to 5 m or more, unbranched; **L** rigidly outcurved, (narrowly) lanceolate, subacuminate, concave, to 2 m × 8 - 15 cm, grey, margins with minute denticles; **Inf** 5 - 13 m, broadly conical, bulbils unknown; scape short; **Fl** 30 - 40 mm, pubescent; **Tep** rather shorter than the **Ov**; **Ov** 20 - 25 mm; **Fr** oblong, narrowed below; **Se** 4 × 6 mm.

The species appears to exhibit the largest inflorescences of any plant, and Verhoek-Williams (1998) mentions 13 m as maximum size. Plants may flower already after 25 (or perhaps even 7 or 8?) years, in contrast to earlier estimations of up to 400 years (Ullrich 1991i).

F. macdougallii Matuda (Cact. Suc. Mex. 1(2): 24-26, ill., 1955). **T:** Mexico (*MacDougall* 269 [MEXU]). – **Lit:** Lott & García-Mendoza (1994). **D:** Mexico (Puebla, Oaxaca); tropical deciduous and thorn forests on calcareous soils, 800 - 1000 m.

[1] Arborescent, stems 6 - 9 m, slender and unbranched; **L** numerous, young **L** erect to patent, old **L** reflexed and persistent, linear, gradually narrowed towards the base, concave, coriaceous, gradually acuminate, scabrous on both faces, 1.2 - 1.45 m × 6 - 7 cm, green, tip slightly hardened, rounded, reddish, margins strongly armed, teeth small, 1 - 3 mm; **Inf** 5 - 8 m, robust, much-branched, part-**Inf** puberulent to tomentose, 1 - 1.5 m, in the upper ½ of the **Inf**; **Bra** much shorter than the **Ped**; **Ped** 5 - 10 mm, puberulent; **Fl** 37 - 40 mm, 2 - 4 grouped together; **Tep** narrowly elliptic to elliptic, papillose, 15 - 22 × 3 - 6 mm, inside green, outside white; **Fil** 10 - 13 mm; **Ov** trigonous, cylindrical, ± 20 mm, with a neck 5 - 8 mm Ø; **Sty** abruptly dilated below but not strongly trigonous, 13 - 16 mm; **Fr** oblong-trigonous, coriaceous, 5 - 7 × 3 - 3.5 cm, inner face yellowish, outer face blackish.

A sterile collection from Chiapas first provisionally placed here by Lott & García-Mendoza (1994) was later described as a new species, *F. niquivilensis*.

F. niquivilensis Matuda ex García-Mendoza (Novon 9(1): 42-45, ill., 1999). **T:** Mexico, Chiapas (*García-Mendoza & al.* 6441 [MEXU, ENCB, K, MO]). – **D:** Mexico (Chiapas); at present only known from cultivation at settlements, 1800 - 2650 m.

[2] Arborescent, stems 1 - 3 × 0.3 - 0.4 m, unbranched, covered with old dry **L**; **Ros** 4 - 5 m Ø; **L** 80 - 150, erect, lanceolate, fibrous, coriaceous, scabrous or muricate on both faces, (1.7-) 1.9 - 2.1 m × 12 - 14 (base 7 - 8.5) cm, green, tip mucronate, 1 - 4 mm, dark chestnut-brown, margins straight, teeth antrorse or erect at the base, 5 - 6 (-8) × 3 - 4 (at the base) mm, chestnut-brown, base yellowish,

decurrent, on small prominences, (1-) 2 - 4 cm apart (middle of the **L**); **Inf** 6 - 9 m, pyramidal, puberulent, part-**Inf** to 2.3 m, bulbilliferous, bulbils (4-) 5.5 - 6.5 × (3-) 4.5 - 6 (-6.5) cm; **Ped** 5 - 10 mm, puberulent; **Fl** (7-) 7.5 - 8 cm, 1 - 3 together; **Tep** oblong, glabrous, but **ITep** papillose on the overlapping parts, (30-) 40 - 45 × 11 - 14 mm, greenish-white, outer faces tinged reddish; **Fil** 20 - 25 mm; **Ov** cylindrical, puberulent, 35 - 38 × 4 - 6 mm, green; **Sty** dilated below, trigonous, papillose, 25 - 28 mm; **Fr** and **Se** unknown.

Sterile collections of this plant were provisionally included under *F. macdougallii* (Lott & García-Mendoza 1994), but the clear differences in vegetative and esp. fertile features merit species status. According to the protologue, both species appear to be closely related and share leaves with both faces scabrous, as well as puberulent inflorescences, pedicels and ovaries.

F. occidentalis Trelease (BJS 50 (Beiblatt 111): 5, 1913). **T:** Peru (*Weberbauer* 1687 [B?]). – **Lit:** Ullrich (1992h). **D:** Peru (Ancash, Huanuco, Loreto, Lima); rocky slopes, 500 - 2500 m.

[1] Stems none or short (?); **L** narrowly oblong, ± 65 × 10 cm, margins minutely aculate, teeth ± deltoid, straight or slightly retrorse, minute, 1 mm, yellow-brown or blackish, terminal **Sp** obtuse and semiglobose, minute, 0.5 × 1 mm; **Inf** 6 m, glabrous, freely bulbilliferous; **Fl** ± 50 mm; **Tep** ± 30 mm, greenish-white; **Ov** ± 20 mm.

Insufficiently known. Most of the references to *F. cubensis* by Weberbauer (1911) concern this species (Macbride 1936). It is a typical element of the W hill country of Peru (Macbride 1936).

F. quicheensis Trelease (Trans. Acad. Sci. St. Louis 23(3): 148, t. 29, 1915). **T:** Guatemala (*Cook* 421 [US 692146]). – **Lit:** Lott & García-Mendoza (1994). **D:** Mexico (Chiapas), Guatemala; oak forests, 2300 - 3300 m.

[1] **Ros** caulescent, stems 1 - 1.5 (-2) m, single or with few **Br**; **L** linear-lanceolate, gradually narrowed towards the base, broadly attenuate, applanate, subcoriaceous, asperous, 0.9 - 1.2 (-1.8) m × 6 - 11 cm, green-glaucous, tip narrowly rounded and obtuse, hardened, margins narrow, subcartilaginous, yellow, with straight minute yellowish denticles 1 - 2 mm apart; **Inf** narrow, 2 - 5 × ≤ 1 m, lower part-**Inf** much reduced, otherwise part-**Inf** < 60 cm; bulbils unknown; **Bra** 2 - 3× longer than the **Ped**; **Ped** glabrous, 20 - 35 mm, reddish; **Fl** (40-) 50 - 70 mm, 6 - 10 grouped together; **Tep** elliptic, 30 - 60 × 10 mm, green-yellowish, margins white, glabrous; **Fil** 10 - 13 mm; **Ov** glabrous, 20 - 35 mm; **Sty** ± 15 mm; **Fr** oblong, shortly rostrate, 5 - 8 × 2 - 3 cm; **Se** 10 × 6 mm.

Cultivated for its fibres. Ullrich (1991i) suggests subspecific rank under *F. longaeva*, to which *F. quicheensis* is apparently closely related.

F. samalana Trelease (Trans. Acad. Sci. St. Louis 23(3): 149, t. 30-31, 1915). **T:** Guatemala (*Trelease* 20 [ILL]). – **Lit:** Lott & García-Mendoza (1994). **D:** Mexico (Chiapas), Guatemala, El Salvador; rocky slopes in scrub or pine forests, 200 - 2700 m.

[1] Stems none or up to 0.5 (-2) m; **L** lanceolate, upper part long-acute, channelled, almost smooth, 1 - 2 m × 10 - 15 cm, green or very slightly greyish, margins broad, flatly outcurved, concave and horny between the teeth, marginal teeth slender, mainly incurved, decurrent over low fleshy elevations, up to 7 mm, reddish chestnut-brown?, (1-) 2 - 5 (-6) cm apart, lacking in the upper ½ to ¾ of the **L**, terminal **Sp** normally lacking, or 1 - 2 mm, reddish; **Inf** 3 - 5 m, oblong-paniculate, part-**Inf** in the upper ¾ of the **Inf**, sometimes with abundant large bulbils, these conical-ovoid, with a tuft of **L**; **Bra** much shorter than the **Ped**; **Ped** glabrous, 3 - 6 (-9) mm; **Fl** 50 - 55 mm, 1 - 3 grouped together; **Tep** elliptic to broadly elliptic, glabrous, (25-) 30 - 40 × 7 - 17 mm, greenish-yellow; **Fil** 12 - 14 mm; **Ov** 16 - 25 × 2 - 4 mm.

Cultivated for its fibres.

F. selloa K. Koch (Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 3: 22, 1860). – **D:** Not recorded. **I:** Jacobsen (1981: t. 85: 1-3).

Incl. *Furcraea selloa* var. *edentata* Trelease (s.a.) ≡ *Furcraea selloa* fa. *edentata* (Trelease) H. Jacobsen (1954) (*nom. inval.*, Art. 33.2); **incl.** *Furcraea selloa* var. *marginata* Trelease (s.a.); **incl.** *Agave cubensis* var. *striata* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Furcraea flavoviridis* Hooker (1860); **incl.** *Furcraea lindenii* Jacobi (1869); **incl.** *Furcraea lindenii* André (1874) (*nom. illeg.*, Art. 53.1) ≡ *Furcraea cubensis* var. *lindenii* (André) Hort. Kew (1897); **incl.** *Furcraea tuberosa* Franceschi (1900) (*nom. illeg.*, Art. 53.1).

[1] Stems finally to 0.9 - 1.5 m; **L** numerous, spreading, narrowly lanceolate, ensiform, much narrowed towards the base, concave and revolute or plicate, very asperous, ± 1 - 1.25 m × 7 - 10 cm, somewhat shining dark green, marginal teeth large, 5 - 6.5 mm, ± 3.3 - 4 cm apart, hooked, variously curved, brown; **Inf** to 6 m tall, glabrous, laxly branched, freely bulbiferous; **Fl** 40 - 65 mm; **Tep** ± 25 mm; **Ov** ± 17 mm.

Described from cultivated material apparently originating from Quetzaltenango, Guatemala, but at present not certainly known from C America (Lott & García-Mendoza 1994). Several variegated or toothless horticultural variants have been described. Even if *F. flavoviridis* (publ. Feb. 1860) should be definitely conspecific, it is antedated by *F. selloa* (publ. Jan. 1860) (Drummond 1907).

F. stratiotes J. B. Petersen (Bot. Tidsskr. 37: 306, 1922). **T:** Nicaragua (*Oersted* s.n. [C]). – **D:** Nicaragua.

[1] Stems none or **Ros** subcaulescent; **L** ± 50,

linear-lanceolate, acuminate, narrowed to 1.5 - 2 cm above the base, 35 - 53 × 2.5 - 3.5 cm, glaucous, tip mucronate, margins straight between the teeth, marginal teeth geminate, 1.5 - 3 mm, 1.5 - 2.5 (-4.5) cm apart; **Inf** 2.8 m, panicle 80 cm, with 3 part-**Inf**, bulbiferous, bulbils to 3.5 × 1.5 cm, strongly compressed (in pressed specimens only ?) with 3 - 5 **L**; **Bra** small, acuminate, entire, much shorter than the **Ped**; **Fl** 22 mm, solitary; **Tep** 14 × 6 mm, whitish, **ITep** somewhat broader; **Fil** 2.5 mm; **Ov** 8 × 2 mm; **Sty** 5 mm; **Fr** unknown.

Only known from the type material based on plants cultivated in Copenhagen (Lott & García-Mendoza 1994).

F. tuberosa (Miller) W. T. Aiton (Hort. Kew., ed. 2 2: 303, 1811). **T:** [icono]: Plukenet, Almag., 19, 1700. – **Lit:** Drummond (1907: with ills.); Álvarez de Zayas (1996a: with ills.). **D:** Greater Antilles (Cuba, Jamaica, Hispaniola, Puerto Rico), Lesser Antilles (all islands); frequent near roads or settlements, flowering December to March.

≡ *Agave tuberosa* Miller (1768); **incl.** *Agave tuberosa* Lamarck (1784) (*nom. illeg.*, Art. 53.1); **incl.** *Agave tuberosa* Aiton (1789) (*nom. illeg.*, Art. 53.1); **incl.** *Furcraea spinosa* O. Targioni Tozzetti (1808) ≡ *Agave spinosa* (O. Targioni Tozzetti) Steudel (1840); **incl.** *Yucca superba* Roxburgh (1814); **incl.** *Agave gigantea* Tussac (1818); **incl.** *Agave vivipara* Maycock (1830) (*nom. illeg.*, Art. 53.1); **incl.** *Agave cubensis* Hasskarl (1856) (*nom. illeg.*, Art. 53.1); **incl.** *Furcraea geminispina* Jacobi (1866) ≡ *Furcraea tuberosa* var. *geminispina* (Jacobi) Trelease (1927); **incl.** *Furcraea interrupta* Hort. van Houtte ex Jacobi (1869); **incl.** *Furcraea tuberosa* Fenzl ex Baker (1879) (*nom. illeg.*, Art. 53.1); **incl.** *Agave gigantea* Baker (1888) (*nom. illeg.*, Art. 53.1); **incl.** *Agave campanulata* Sessé & Mocino (1894).

[1] Stems none or short, hardly 30 cm; **Ros** semi-globose in outline; **L** up to 60, broadly oblong-lanceolate, nearly flat, moderately canaliculate towards both ends, subcoriaceous, smooth, 1.1 - 1.5 (-1.8) m × 10 - 15 (-17) cm, bright green, tip acute, slightly canaliculate, mucro 1 - 2 mm, margins between the teeth straight, marginal teeth simple and recurved or geminate, 5 - 10 (-13) mm, decurrent, 2 - 6 (-12) cm apart, brown-reddish; **Inf** 5 - 8 m, fusiform, part-**Inf** lax, in the upper ¾ of the **Inf**, to 80 cm, bulbiferous, bulbils numerous, ovoid; **Ped** 6 - 9 mm; **Fl** (38-) 42 - 51 (-55) mm, 1 - 3 grouped together; **Tep** oblong, (18-) 21 - 27 (-30) × 6 - 9 mm, greenish-whitish; **ITep** slightly broader than the **OTep**; **Fil** 15 - 25 mm; **Ov** 20 - 25 mm; **Sty** 15 - 25 mm; **Fr** unknown.

Drummond (1907), Trelease (1915a), and Álvarez de Zayas (1996a) placed *F. geminispina* in the synonymy of *F. tuberosa*, in contrast to a placement in the synonymy of *F. acaulis* (Ullrich 1992h). Since *F. geminispina* was described by Jacobi from

small cultivated plants of unknown origin and as it is not typified, its identity can possibly never be solved unambiguously.

F. undulata Jacobi (Abh. Schles. Ges. Vaterl. Cult., Abth. Naturwiss. 1869: 170, 1869). – **D:** Not certainly known from the wild.

Incl. *Furcraea pubescens* Todaro (1879); **incl.** *Furcraea pubescens* Baker (1892) (*nom. illeg.*, Art. 53.1).

[1] **Ros** (almost) acaulescent; **L** numerous, spreading, narrowly lanceolate, long-acuminate, base strongly thickened on both faces, keeled below, concave, smooth, to 1.3 - 1.5 m × 7 cm, fresh to dark olive-green, margins wavy, marginal teeth along the whole margin, triangular, upcurved, 5 mm, ± 1.7 - 3 cm apart, brown, terminal **Sp** obtuse, brown; **Inf** 4.5 - 7 m, richly branched, scape rather short, part-**Inf** finely pubescent, bulbilliferous, bulbils ovoid; **Fl** ± 55 mm, finely pubescent, fragrant; **Tep** greenish-yellow; **OTep** 35 × 12 - 14 mm; **ITep** 20 mm broad; **Ov** 25 mm. – *Cytology*: 2n = 120.

A species of uncertain status. Jacobi attributed it to Chiapas and Tabasco (Mexico), but no material from S Mexico matches the description (Lott & García-Mendoza 1994). Distribution records for El Salvador, the Lesser Antilles or Puerto Rico are apparently all doubtful.

HESPERALOE

J. Thiede

Hesperaloe Engelmann ex S. Watson (in S. Watson, Bot. US Geol. Expl. 40. Parallel, 5: 497, 1871). – **Lit:** Gentry (1972); Starr (1995); Starr (1997). **D:** USA (Texas), N Mexico (Sonora, Coahuila, Nuevo León, San Luis Potosí). **Etym:** Gr. 'hespera', evening; for the occurrence in North America (i.e. in the West, where the sun disappears in the evening); and for the superficial similarity with *Aloe* (*Aloaceae*).

Acaulescent perennials; main **R** thick and fleshy, with many additional fibrous **R**; **Ros** monocarpic, caespitose with short to long rhizomes, forming grass-like clumps with bulbous fibrous bases; **L** few to many, linear-elongate, succulent, fibrous, either thin, narrow and arching to recurved, or thick, broad and stiffly erect, canaliculate, either tightly packed or widely separated and forming large rings, **L** tip frayed or a hard **Sp**, **L** margins narrow, brown or white, filiferous, fibres thin and tightly curled to thick and nearly straight, white or grey; **Inf** terminal, from the centre of mature **Ros**, ascending, to 4 m, racemose to paniculate, with 3 - 8 part-**Inf** in the upper ½; **Ped** arising from indeterminate lateral spurs, either on the main stalk or on side **Br**; **Fl** stipitate, not opening in sequence, 6-merous, narrowly campanulate with ± connivent **Tep**, in indeterminate clusters on unequal **Ped**; **Per** appearing tubular to narrowly to broadly campanulate or rotate-cam-

panulate; **Tep** with fleshy keel, about equal, essentially free but united on a fleshy nectariferous **Rec**, coloured with combinations of green, white, and purplish-brown to red, pink, salmon, or coral-red to rarely yellow; **Fil** inserted on the **Rec** or adnate to the base of the **Tep**, included; **Anth** dorsifixed, sagittate, introrse, included to exserted; **Ov** superior, ovoid to oblong, trigonous, with 3 locules, each with numerous ovules in 2 ranks; **Sty** elongate but included in the **Per**; **Sti** distinctly capitate, fringed with papillae; **Fr** septicidal woody capsules, stipitate, beaked or not, transversely rugose, persistent; **Se** large, black, flat, thin. – *Cytology*: x = 30.

According to recent molecular and morphological phylogenies, *Hesperaloe* is closest to the monotypic genus *Hesperoyucca*, and both represent sister groups (see Bogler & Simpson (1995), Clary & Simpson (1995) and Bogler & Simpson (1996)). Both genera show the following putative shared derived features: Leaves with papillate epidermal cells arranged over the veins, stamens adnate to the tepal base or lower part of the tepals, styles slender, and stigmas fringed with papillae. *Hesperaloe* differs from *Hesperoyucca* esp. in its coarsely grass-like habit, the filiferous leaf margins, and the flower colour (never purely whitish) and ± connivent tepals. Differences from *Yucca* are as mentioned above for *Hesperoyucca*, plus the capitate stigma and the colourful ± connivent tepals.

The geographical range of *Hesperaloe* is remarkable: 2 species are found W of the Sierra Madre Occidental (which represents an important floristic continental divide), 3 species are mainly confined to the E Chihuahuan Desert region.

The flowers of *Hesperaloe* are pollinated by either hummingbirds as well as bees (*H. parviflora*) or by bats and hawkmoths (*H. funifera* and *H. nocturna*). *H. campanulata* combines both syndromes and is pollinated by bats and hawkmoths during the night and by hummingbirds and bees the following day, when the flowers close somewhat to form a tube (Starr 1997).

H. campanulata G. D. Starr (Madroño 44(3): 285-286, ill., 1997). **T:** Mexico, Nuevo León (Starr 93-001 [ARIZ, MEXU, MO, TEX]). – **Lit:** Starr (1995: with ill.). **D:** Mexico (C Nuevo León); open Chihuahuan Desert scrub, limestone slopes and hillsides, 100 - 550 m, flowers March to October.

Ros moderately caespitose, forming clumps to 0.6 - 1 × 1 m; **L** stiff and erect to slightly spreading, linear-lanceolate, tapering towards the tip, slightly canaliculate, 60 - 105 × 1.5 - 2.6 cm (widest point ¼ from the base), medium green, margins finely filiferous; **Inf** to 3 m, unbranched racemes or panicles with 2 - 5 **Br** in the upper ½; **Fl** tubular-campanulate to broadly campanulate, 20 - 22 × 20 - 22 mm; **Ped** 8 - 13 mm; **OTep** linear to linear-lanceolate, 18 - 22 × 4 - 8 mm, inside white, outside pink with

broad white margins; **St** included; **Fil** 14 - 15 mm, adnate to the **Tep** base for 3 mm; **Anth** 3 mm; **Ov** 6 × 4 mm; **Sty** 9 - 13 mm, included; **Fr** woody capsules, globose or oblong, 20 - 30 (excl. beak) × 20 - 25 mm, with a sharp 4 - 11 mm long beak; **Se** black, 6 - 9 × 5 - 6 mm.

Vegetatively looking like a small *H. funifera*, but easily separated by the flower colour. Distinguished from *H. parviflora* by more open flowers and lighter green less channelled leaves (Starr 1995).

H. funifera (Koch) Trelease (Annual Rep. Missouri Bot. Gard. 13: 36, pl. 3-4, 1902). **T** [neo]: Mexico, Coahuila (*Engard & Gentry* 23241 [ARIZ]). – **Lit**: Ullrich (1990a); Starr (1995). **D**: S USA, N Mexico.

≡ *Yucca funifera* Koch (1862) ≡ *Agave funifera* (Koch) Lemaire (1864).

H. funifera ssp. **chiangii** G. D. Starr (Madroño 44(3): 289-290, ill., 1997). **T**: Mexico, San Luis Potosí (*García Moya* s.n. [DES]). – **D**: Mexico (San Luis Potosí, probably also S Nuevo León and SW Tamaulipas); locally common on flats and open slopes.

Differs from ssp. *funifera*: **Ros** long-rhizomatous, forming wide clumps or fairy rings to 2 m Ø; **L** stiff and erect, lanceolate, not arching, deeply canalliculate, 1 - 1.5 m × 5 - 6 cm (when flattened), medium to dark green, marginal fibres coarse, 2 - 3 mm Ø, white to grey near point of attachment, straight to slightly coiled.

This subspecies was already collected by C. G. Pringle in 1891. Ullrich (1990a) mentions localities for *H. funifera* in S Nuevo León and SW Tamaulipas, which may represent new records for *H. funifera* ssp. *chiangii*.

H. funifera ssp. **funifera** – **D**: USA (C-SW Texas), Mexico (E and C Coahuila, N Nuevo León); calcareous lowlands and foothills, 500 - 1000 m, flowers April to August.

Incl. *Hesperaloe davyi* Baker (1898).

Ros forming clumps to 1.5 m Ø; **L** stiff and erect, linear-lanceolate or lanceolate, not arching, canalliculate, 1 - 2 m × 3 - 4 cm (when flattened), tapering from the middle towards the tip, light or yellowish-green, **L** tip with a **Sp**, **L** margins brown, medium to coarsely filiferous, fibres loosely coiled, 1 mm Ø, white or grey; **Inf** 2 - 4 m, with 3 - 8 part-**Inf** mostly in the upper ½; **Ped** 5 - 6 mm; **Fl** in indeterminate fascicles, rotate-campanulate, 25 mm, opening in the morning, closing in the evening of the same day; **Tep** white inside, 17 - 20 mm; **ITep** outside green and white with a narrow mid-stripe tinged brownish-purple, 8 - 9 mm wide; **OTep** outside green at the base, upper ⅓ reddish-purple, 6 - 7 mm wide; **St** included; **Ov** 10 - 12 × 4 - 5 mm; **Fr** woody capsules, globose or broadly oblong, 25 - 23

× 25 - 35 mm, sharply beaked, beak 2 - 4 mm; **Se** 8 - 9 × 5 - 7 mm, black. – **Cytology**: 2n = 60.

Mature plants are easily recognizable by their stiff long leaves. Young plants are difficult to distinguish from *H. parviflora*, but the leaves are greener and stiffer in *H. funifera* (Starr 1995).

H. nocturna Gentry (Madroño 19(3): 74-78, 1967). **T**: Mexico, Sonora (*Gentry & Felger* 19988 [US]). – **Lit**: Gentry (1972: with ill.). **D**: Mexico (N-C Sonora); 950 - 1150 m, flowers April to July.

Ros very dense, densely caespitose and forming clumps 1 - 2 m Ø; **L** upright and arching, linear, striate, tip long-attenuate, deeply canalliculate, flat towards the base, 1 - 1.5 m × 1 - 2 cm (at the base), tip an acicular and pungent **Sp**, fraying with age, **L** margins narrow, brown, white-filiferous, fibres irregularly wavy, white; **Inf** slender panicles, to 1.5 - 4 m, with 2 - 3 part-**Inf** in the upper ½; **Ped** 14 - 16 mm; **Fl** campanulate-rotate, 24 - 30 mm, nocturnal, in indeterminate fascicles; **Tep** reflexed at anthesis, 15 - 25 mm, buds pruinose pink to lavender, tube 2 - 3 mm; outside of the **ITep** at anthesis with broad reddish-purple mid-stripe, 8 - 9 mm wide; outside of the **OTep** reddish with greenish-brown mid-stripe, 6 - 7 mm wide; **St** included; **Fil** equalling the **Sty**, 8 - 9 mm, attached to the base of the **Tep** for 3 mm; **Anth** sagittate, versatile, 8 - 9 mm; **Ov** oblong, trigonous, 10 × 4 mm; **Sty** stout, 8 mm, included; **Sti** capitate, papillate; **Fr** woody capsules, depressed-ovoid or oblong, shortly beaked, rugose, 30 - 40 × 25 - 45 mm; **Se** black, 11 × 8 mm.

Easily identifiable by its long narrow leaves and nocturnal flowers (Starr 1995).

H. parviflora (Torrey) J. M. Coulter (CUSNH 2: 436, 1894). **T** [lecto]: USA, Texas (*Wright* 1908 [GH, NY]). – **D**: USA (C Texas), Mexico (NW Coahuila); in Creosote Bush desert, oak and chaparral zones, 600 - 2000 m, flowers March to September.

Fig. IX.a

≡ *Yucca parviflora* Torrey (1859); **incl.** *Hesperaloe yuccoides* hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Aloe yuccaefolia* A. Gray (1867) (*nom. illeg.*, Art. 52.1) ≡ *Hesperaloe yuccaefolia* (A. Gray) Engelm. (1871) (*nom. illeg.*, Art. 52.1); **incl.** *Hesperaloe engelmannii* Krauskopf ex S. Watson (1879) ≡ *Hesperaloe parviflora* var. *engelmannii* (Krauskopf ex S. Watson) Trelease (1902).

Ros densely caespitose, forming clumps to 1 m Ø; **L** arching, linear, narrowing towards the tip, 30 - 60 (-120) × 0.8 - 1.8 cm (at the base), dark green, margins finely filiferous, fibres tightly curled; **Inf** panicles to 1 - 2.5 m, part-**Inf** few, mainly in the upper ½; **Fl** tubular or oblong-campanulate, 25 - 35 mm, diurnal, in indeterminate fascicles; **Tep** pressed together at anthesis, 15 - 20 × 4 - 8 mm (**ITep** 17 mm long), salmon-coloured, coral-red, pink, or rosy-red (also yellow in a horticultural selection); **St** included; **Fil** elongate, 7 - 13 mm, at-

tached to the base of the **Tep** for 1 mm; **Anth** 2 - 3 mm; **Ov** ovoid, small, 4 - 6 × 3 - 4 mm; **Sty** slender, elongate, included, 12 - 13 mm; **Fr** woody, ovoid or oblong-ovoid, 30 - 40 × 25 - 30 mm, rugose, beaked; **Se** 9 - 10 × 6 - 7 mm, black.

Distinguished by the combination of narrow, mainly salmon-coloured to reddish flowers and relatively short and dark green leaves (Starr 1995).

H. tenuifolia G. D. Starr (Madroño 44(3): 293-294, ills., 1997). **T:** Mexico, Sonora (*Meyer & Jenkins* 9063 [ARIZ]). – **Lit:** Starr (1995: with ills.). **D:** Mexico (S Sonora: Cerro Agujudo); dry rhyolitic hilltops in pine-oak forest, 1500 m (only known from the type locality), flowers April to May.

Ros open, sparsely caespitose and forming small clumps to 50 cm Ø; **L** few, arching, narrowly linear, tapering towards the tip, 50 - 100 × 0.5 - 1 cm (at the base), margins thin, finely filiferous, fibres not tightly curled, white; **Inf** racemes or narrow panicles with 2 - 3 part-**Inf**, to 1.5 - 2 m; **Fl** rotate, 13 × 10 mm, nocturnal; **OTep** linear, 13 × 5 mm, outside dark pinkish-red, inside white with reddish margin; **ITep** ovate, 15 × 8 mm, outside dark pinkish-red with white margin, inside white; **St** included; **Fil** 9 mm, attached to the base of the **Tep** for 2 mm; **Anth** 3 mm; **Ov** 6 × 3 mm; **Sty** 4 mm; **Fr** woody, ovoid, 20 - 30 × 20 - 25 mm, beak none or 1 mm; **Se** black, 10 × 5 - 7 mm.

Very easily recognized by its long and very thin leaves with finely textured slightly curly marginal fibres. The very short open flowers cannot be confused with those of other species (Starr 1995).

HESPEROYUCCA

J. Thiede

Hesperoyucca (Engelmann) Baker (BMI 1892(5): 8, 1892). **T:** *Yucca whipplei* Torrey. – **D:** W USA, NW Mexico. **Etym:** Gr. 'hespera', evening; for the occurrence in W North America (i.e. in the West, where the sun disappears in the evening); and for the similarity to *Yucca* (Agavaceae).

≡ *Yucca* Sect. *Hesperoyucca* Engelmann (1873)

Ros sessile, sometimes stem rhizomatous, single or caespitose; **L** linear or rarely narrowly lanceolate, rigid and sword-like to flexible and frequently falcate, plano-convex or subtriquetrous, or keeled on both faces, 25 - 115 × 0.5 - 4 cm, ± grey-green, finely striate, base expanded, ± 4 - 7 × 4 - 7 cm, ± white to greenish, margin thin, horny, without fibres, teeth ± finely serrulate, end-**Sp** sharp; **Inf** terminal and **Ros** monocarpic, large, dense, cylindrical or somewhat slenderly ellipsoidal, 1.4 - 8 m with a bracteate scape 0.9 - 4.5 m long; **Fl** densely arranged, usually broadly expanding, pendent, ± globose, 3.5 - 5 cm, very fragrant; **Tep** broadly lanceolate, nearly equal, 30 - 65 × 8 - 25 mm, white, tips generally purple, tube none; **Fil** straight, linear below, tip

angled, club-like, attached to the lower part of the **Tep**, so that they are pulled away from the **Ov** as the **Fl** opens; pollen uniquely glutinous; **Ov** stout, 8 - 12 × 6 - 10 mm; **Sty** short, slender; **Sti** distinctly capitate, green towards center, fringed with elongated translucent papillae; **Fr** obovoid, strictly loculicidally dehiscent, 3 - 5 cm; **Se** flat, thin, smooth, without marginal wing, 6 - 7 × 8 mm, dull black. – *Cytology:* n = 30.

Hesperoyucca is re-established here as a monotypic genus based on recent phylogenetic studies and clear character differences from *Yucca*. With the exception of Trelease (1902), all authors included *Hesperoyucca* as a section or subgenus within *Yucca*. Recent molecular studies by Bogler & Simpson (1995), Bogler & Simpson (1996) and Clary & Simpson (1995) and structural phylogenies shown by Clary & Simpson (1995) clearly revealed a position independent of *Yucca* as sister group of *Hesperaloe* (in the structural phylogeny of Hernández Sandoval (1995), however, *Hesperoyucca* is associated with *Yucca* and not with *Hesperaloe*). *Hesperoyucca* and *Hesperaloe* again either represent the sister group of *Yucca* or of the remaining genera of Agavaceae (Bogler & Simpson l.c., Clary & Simpson l.c.).

Hesperoyucca differs clearly from *Yucca* (data in brackets) in forming a definite bulb in the seedling stage (Webber 1953: pl. 53) (absent, needs further study), its capitate stigma (vs. 6-lobed), its strictly loculicidally dehiscent fruits (vs. indehiscent or, if dehiscent, commonly septicidal, occasionally also septicidal and loculicidal), its filaments basally attached to the tepals and without apical thickenings (vs. filaments not attached to the tepals, but held close to the ovary and bent outwards near the swollen apex). The often very large inflorescences of *Hesperoyucca* by far exceed inflorescence size in *Yucca*, and unbranched plants ("ssp. *whipplei*") are monocarpic, whereas some branched plants ("ssp. *caespitosa*") develop new rosettes from the leaf axils of very young plants; both features are unknown in *Yucca*.

Haines (1941) recognized 5 varieties based largely on growth form (rosettes single or multiple by either branching or produced by rhizomes). Since wild populations often contain plants of different "varieties" (Keeley & Tufenkian 1983) and seeds from one capsule may even produce all possible growth forms (DeMason 1984), no infraspecific taxa are recognized here.

H. whipplei (Torrey) Baker (BMI 1892(5): 8, 1892). – **Lit:** Turner & al. (1995). **D:** USA (SW California, Arizona: W Grand Canyon), Mexico (N Baja California, N Baja California Sur, NW Sonora: Pinacate region). **I:** Bolliger (1998); Hochstätter (2000a). **Fig. VIII.d, VIII.e**

≡ *Yucca whipplei* Torrey (1859); **incl.** *Yucca californica* Groenland (1858); **incl.** *Yucca graminifolia*

Wood (1868) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca whipplei* var. *caespitosa* M. E. Jones (1929) $\equiv$ *Yucca whipplei* ssp. *caespitosa* (M. E. Jones) A. L. Haines (1942); **incl.** *Yucca whipplei* var. *parishii* M. E. Jones (1929) $\equiv$ *Yucca whipplei* ssp. *parishii* (M. E. Jones) A. L. Haines (1941); **incl.** *Yucca whipplei* ssp. *typica* A. L. Haines (1941) (*nom. inval.*, Art. 24.3); **incl.** *Yucca whipplei* ssp. *intermedia* A. L. Haines (1942) $\equiv$ *Yucca whipplei* var. *intermedia* (A. L. Haines) J. M. Webber (1953); **incl.** *Yucca whipplei* ssp. *percursa* A. L. Haines (1942) $\equiv$ *Yucca whipplei* var. *percursa* (A. L. Haines) J. M. Webber (1953); **incl.** *Yucca newberryi* McKelvey (1947) $\equiv$ *Yucca whipplei* ssp. *newberryi* (McKelvey) Hochstätter (2000); **incl.** *Yucca peninsularis* McKelvey (1947); **incl.** *Yucca whipplei* ssp. *eremica* Epling & A. L. Haines (1957).

Description as for the genus.

Y. californica is here listed as synonym with considerable doubt and would have priority if it is indeed conspecific.

H. whipplei is winterhardy in protected sites outdoors in Central Europe and may reach flowering size in as little as 13 years (Bolliger 1998).

YUCCA

J. Thiede

Yucca Linné (Spec. Pl. [ed. 1], 319, 1753). **T:** *Yucca aloifolia* Linné [Lectotype, designated by Britton & Shafer, North Amer. Trees, 151, 1908 (fide ING).]. – **Lit:** Trelease (1902); McKelvey (1938); McKelvey (1947); Webber (1953); Reveal (1977); Matuda & Piña Lujan (1980); Hochstätter (2000b). **D:** S Canada, N, C and S USA, Mexico, possibly Guatemala; cultivated worldwide. **Etym:** Name first used 1557 in a German travelogue and probably derived from a name used on Hispaniola through Span. ‘yuca’, which is, however, used for the edible root tubers of Cassava, and that was perhaps erroneously applied to *Yucca* for the edible flowers of some species.

Incl. *Iuka* Adanson (1763) (*nom. inval.*, Art. 61.1).

T: *Yucca aloifolia* Linné.

Incl. *Clistoyucca* (Engelmann) Trelease (1902). **T:** *Clistoyucca arborescens* (Torrey) Trelease [*nom. illeg.*, $\equiv$ *Yucca brevifolia* Engelmann].

Incl. *Samuela* Trelease (1902). **T:** not designated.

Woody perennials, terrestrial (very rarely epiphytic: *Y. lacandonica*); stems none, short, or thick and arborescent, then usually $\pm$ branched; **Ros** terminal; **L** mostly numerous, $\pm$ ensiform, nearly linear, thin and flexible or thicker and very rigid, margins entire, horny, often desintegrating into fibres, terminal **Sp** often present; **Inf** large panicles; **Fl** pedicellate, usually $\pm$ pendent, $\pm$ campanulate to globose, large, fleshy; **Tep** 3 + 3, all similar and subequal in size, mostly white or whitish (or greenish or slightly reddish), **Tep** tube none, short or up to $\pm$ 1/2 of the **Tep**

length; **St** 3 + 3; **Fil** fleshy, clavate, or slightly swollen beneath the small versatile **Anth**, pubescent or at least papillose; **Ov** superior, 3-locular; **Sty** very short or none, with 3 short branches with a 2-lobed **Sti** each; **Fr** many-seeded loculicidal capsules with $\pm$ intruding dorsal false septa, more rarely septicidal, or baccate and indehiscent; **Se** flat and thin, black. – *Cytology:* $x = 30$.

The genus includes $\pm$ 45 mostly xerophytic species. They are more xerophytic than succulent and therefore fall mostly outside the scope of this Lexicon. However, many species of *Yucca* are horticulturally important or represent dominant elements of arid vegetations, and in order to provide a complete treatment of the family *Agavaceae*, the genus is dealt with in full here.

Yucca is easily recognizable by the typical filiferous leaf margin, which is otherwise only found in *Hesperaloe* and a couple of *Agave* species. The mostly whitish wax-like pendent flowers in usually compact inflorescences are another diagnostic feature of the genus. There is a closely knit symbiosis between *Yucca* species and its pollinator, the Yucca Moth (Powell 1984): Females of the various species of Yucca Moths emerge in time at the onset of flowering of the Yuccas. Upon visiting a flower, they deposit an egg in one of the 3 chambers of the ovary, and subsequently actively collect some pollen, which is placed between the stigmas when the next flower is visited. Recent phylogenetic studies indicated this symbiosis to have independently originated both in *Yucca* and *Hesperoyucca* (Bogler & al. 1995).

Recent preliminary morphological and molecular phylogenies (Clary & Simpson 1995) indicate the necessity of a complete reclassification of *Yucca*, since none of the traditionally recognized series within the genus is monophyletic in either data set. These data suggested that the traditional separation into berry-fruited taxa (= Sect. *Yucca* / *Sarcocarpa*) and capsule-fruited species (Sect. *Chaenocarpa*) is artificial (see also the comment for *Y. linearifolia*).

Since no updated classification is available, the traditional infrageneric division based on McKelvey (1938) and McKelvey (1947) is repeated here in short, albeit all of her series names are invalidly (Art. 32.1c) published:

[1] Sect. *Yucca* (incl. Sect. *Euyucca* Engelmann 1873, *nom. inval.*; incl. Ser. *Sarcocarpa* Engelmann 1873 / Trelease 1902, *nom. illeg.*): **R** fibrous; adult plants mainly stem-forming, rarely rhizomatous (*Y. endlichiana*); **L** of young plants (< 6 years) few, broadened and generally reddish; **Fr** indehiscent, representing $\pm$ large fleshy berries; **Se** rough, unwinged.

[1a] Ser. *Faxoniana* McKelvey 1938, *nom. inval.* (incl. *Samuela* Trelease 1902).

[1b] Ser. *Baccatae* McKelvey 1938, *nom. inval.*

[1c] Ser. *Yucca* (incl. Ser. *Treculiana* McKelvey 1938, *nom. inval. et illeg.*).

- [1d] Ser. *Heteroyucca* Trelease 1902.
- [2] Ser. *Clistoyucca* Engelm. 1873 ($\equiv$ *Clistoyucca* (Engelm.) Trelease 1902): **Fr** indehiscent, dry and spongy; **Se** smooth, unwinged. Only *Y. brevifolia*.
- [3] Sect. *Chaenoyucca* (Engelm.) Trelease 1902 ($\equiv$ Ser. *Chaenoyucca* Engelm. 1873): **R** of young plants bulbous, adult plants rhizomatous; **L** of young plants many, thin and greenish-glaucous; **Fr** dehiscent dry capsules soon becoming erect at maturity; **Se** smooth, winged or unwinged.
- [3a] Ser. *Rupicola* McKelvey 1947, *nom. inval.*
- [3b] Ser. *Elatae* McKelvey 1947, *nom. inval.*
- [3c] Ser. *Constrictae* McKelvey 1947, *nom. inval.*
- [3d] Ser. *Harrimaniae* McKelvey 1947, *nom. inval.*
- [3e] Ser. *Arkansanae* McKelvey 1947, *nom. inval.*
- [3f] Ser. *Glaucæ* McKelvey 1947, *nom. inval.*
- [3g] *Y. filamentosa* and related species.

The genus *Yucca* is "one of the most difficult" of the USA (Reveal 1977) due to its complex nomenclature including many older names of uncertain application and horticultural names, as well as the variability of many taxa, which apparently often includes hybridization and introgression. The following synopsis can only represent a first step towards a better understanding of the genus, without intending at all to solve the many remaining problems.

Hochstätter (2000b) indicates the following species to be hardy outdoors in C Europe: *Y. arkansana*, *Y. angustissima*, *Y. baccata*, *Y. baileyi*, *Y. elata*, *Y. filamentosa*, *Y. glauca*, *Y. gloriosa*, *Y. harrimaniae*, *Y. pallida* and *Y. recurvifolia*. The following species need additional protection from moisture: *Y. faxoniana*, *Y. rupicola*, *Y. rostrata* and *Y. thompsoniana* (Hochstätter 2000b). – Vernacular name: "Palm Lily".

House plants sold as 'Yuccas' by the horticultural trade are usually species of the genus *Cordylina* (variously classified as *Asteliaceae* or [as used in this Lexicon] *Dracaenaceae*).

The following names are of unresolved application but are referred to this genus: *Yucca acutifolia* Truffaut (1869); *Yucca xandreaana* Deleuil (s.a.); *Yucca atkinsii* Trelease (1894); *Yucca barrancaseca* hort. ex Pasquale (s.a.); *Yucca xcarrierei* Deleuil (s.a.); *Yucca xcarrierei* André (1895); *Yucca conspicua* hort. ex Regel (1871) (*nom. illeg.*, Art. 53.1); *Yucca contorta* hort. ex Carrière (1858); *Yucca crinifera* Lemaire (1846); *Yucca desmetiana* Baker (1870); *Yucca ehrenbergii* Baker (1875); *Yucca xensifera* Deleuil (s.a.); *Yucca ensifolia* Baker (1870); *Yucca fuauxiana* hort. (s.a.); *Yucca gigantea* Lemaire (1859); *Yucca gracilis* Link ex Sweet (1830); *Yucca hanburii* Baker (1892); *Yucca horri-*

da Humboldt ex Steudel (1840); *Yucca howard-smithii* Trelease (1937); *Yucca xjuncea* Deleuil (s.a.); *Yucca xkarlsruhensis* Graebner (1903); *Yucca xmassiliensis* Deleuil (s.a.); *Yucca mexicana* Sessé & Mocino (1894) (*nom. illeg.*, Art. 53.1); *Yucca nitida* W. Watson (1906); *Yucca pitcairniifolia* Karwinsky ex G. Don (1839); *Yucca rubra* hort. ex Lavallée (1877); *Yucca spinosa* Kunth (1822); *Yucca stenophylla* Steudel (1840); *Yucca xstriatula* Deleuil (s.a.); *Yucca xsulcata* Deleuil (s.a.); *Yucca toneliana* Lemaire (1865) (*nom. illeg.*, Art. 53.1); *Yucca xtreleasei* Sprenger (1901); *Yucca vomerensis* Sprenger (s.a.).

Y. aloifolia Linné (Spec. Pl. [ed. 1], 319, 1753). **T**: [lecto – icono]: Dillenius, Hort. Eltham., t. 323: fig. 416, 1732. – **Lit**: Matuda & Piña Lujan (1980: with ills.); Lott & García-Mendoza (1994). **D**: Mexico (probably only native in Veracruz and Yucatán); plains and slopes in tropical deciduous forests, to 1800 m.

Incl. *Yucca draconis* Linné (1756) $\equiv$ *Yucca aloifolia* var. *draconis* (Linné) Engelm. (1873); **incl.** *Yucca haruckermaniana* Crantz (1768); **incl.** *Yucca arcuata* Haworth (1819); **incl.** *Yucca conspicua* Haworth (1819) $\equiv$ *Yucca aloifolia* var. *conspicua* (Haworth) Engelm. (1873); **incl.** *Yucca crenulata* Haworth (1819); **incl.** *Yucca serrulata* Haworth (1819); **incl.** *Yucca tenuifolia* Haworth (1819); **incl.** *Yucca armata* Steudel (1840); **incl.** *Yucca aloifolia* var. *stenophylla* Bommer (1859); **incl.** *Yucca parmentieri* hort. ex Carrière (1859); **incl.** *Yucca yucatanana* Engelm. (1873) $\equiv$ *Yucca aloifolia* var. *yucatanana* (Engelm.) Trelease (1902); **incl.** *Yucca purpurea* hort. ex Baker (1880); **incl.** *Yucca quadricolor* hort. ex Baker (1880); **incl.** *Yucca tricolor* hort. ex Baker (1880).

[1c] Arborescent with stems to 8 m, slender, erect, simple or densely branched, sometimes with offsets; **L** rigid, patent, flattened or slightly concave, 25 - 60 $\times$ 2.5 - 6 cm, brilliant dark green, tip acute (pungent), margins rather horny, denticulate; **Inf** panicle, pendent, tomentose; **Fl** globose, to 5 $\times$ 10 cm; **Tep** ovate, 30 - 40 $\times$ 15 - 22 mm, whitish with purple or green tinge towards the base; **Fil** slightly papillose, 8 - 10 mm; **Ov** oblong, basally constricted, 15 mm; **Fr** fleshy berries, ellipsoid, prismatic, 3.5 - 5 $\times$ 2 - 2.6 cm, blackish, pulpa purple; **Se** ovoid, thick, 5 - 6 $\times$ 6 - 7 mm.

Widely cultivated as foliage plant in (sub-) tropical gardens as well as indoors, esp. in the form of variegated cultivars.

Y. angustissima Engelm. ex Trelease (Annual Rep. Missouri Bot. Gard. 13: 58, 1902). **T**: USA, Arizona (Bigelow s.n. [MO 148375 + 148376]). – **Lit**: Hochstätter (2000b). **D**: USA (S Utah, N and C Arizona, W New Mexico).

For differences from *Y. elata* see there.

Y. angustissima var. **angustissima** – **Lit:** Reveal (1977); Hochstätter (2000b); both with ill. **D:** S USA (SW Utah, N Arizona, W New Mexico); desert flats or mesas, often in sandy places or near sandstone outcrops, 1050 - 2550 m.

[3b] Stems none to short and procumbent, 10 - 40 cm, or caulescent and erect, to 1 m; **Ros** compact, solitary or in small to large clumps to 3 m Ø; **L** rigidly spreading, flexible, linear, base broad, tip tapering, long-acuminate, flatly convex to flat and keeled, rarely canaliculate, 25 - 60 (-75) × 0.4 - 1.5 cm, pale yellow to blue-green, margins entire, cream to tan or reddish-brown, forming few fine slightly curled fibres, terminal **Sp** 3 - 7 mm; **Inf** erect, scape 0.2 - 2.5 m, glabrous or finely pubescent, racemose, simple, flowering part 0.2 - 1.5 (-2) m, well above the **L**, with few part-**Inf**; **Ped** slender, 1 - 2.5 (-4) cm; **Fl** pendent, campanulate to globose, 3 - 6.5 cm; **Tep** elliptic to ovate, **ITep** broader than the **OTep**, lanceolate, white to cream or greenish-white, often tinged with rose or rose-purple, tube 3 - 7 mm; **Ov** (0.7-) 1 - 2.5 cm; **Fr** dry capsules, commonly with a deep central constriction, oblong-cylindrical, 3.5 - 7.5 × 2 - 3 cm; **Se** thin, 5 - 7 mm, dull black. – *Cytology:* n = 30.

Y. angustissima var. **avia** Reveal (in Cronquist & al., Intermountain Fl. 6: 534, ill. (p. 535), 1977). **T:** USA, Utah (Jones 5639a [US]). – **Lit:** Reveal (1977). **D:** USA (C Utah); mainly on loamy-rocky soils.

≡ *Yucca angustissima* ssp. *avia* (Reveal) Hochstätter (1999).

[3b] Differs from var. *angustissima*: **L** 40 - 60 cm; **Fl** 3.5 - 4.5 cm; **Sty** 7 - 10 mm.

This taxon is distinguished by minor quantitative features only and is included in the synonymy of var. *angustissima* by USDA (2001) but may be recognized due to its geographical isolation.

Y. angustissima var. **kanabensis** (McKelvey) Reveal (in Cronquist & al., Intermountain Fl. 6: 534, ill. (p. 535), 1977). **T:** USA, Utah (McKelvey 4347A [A]). – **Lit:** Reveal (1977). **D:** USA (S Utah, N Arizona); sandy places.

≡ *Yucca kanabensis* McKelvey (1947) ≡ *Yucca angustissima* ssp. *kanabensis* (McKelvey) Hochstätter (1999).

[3b] Differs from var. *angustissima*: **L** 45 - 75 (-150) cm; **Inf** 2 - 4.5 m, scape 1 - 1.5 m, flowering part 1 - 2 m; **Fl** 5.5 - 6.5 cm; **Ov** 3 - 3.5 cm; **Sty** 5 - 8 mm; **Fr** moderately constricted, larger, 4.5 - 7.5 cm.

Y. angustissima var. **toftiae** (S. L. Welsh) Reveal (in Cronquist & al., Intermountain Fl. 6: 534, ill. (p. 535), 1977). **T:** USA, Utah (Welsh 11935a [BRY, NY, US]). – **Lit:** Reveal (1977). **D:** USA (Utah); sandy alluvium and sandstone outcrops and mesas.

≡ *Yucca toftiae* S. L. Welsh (1975) ≡ *Yucca angustissima* ssp. *toftiae* (S. L. Welsh) Hochstätter (1999).

[3b] Differs from var. *angustissima*: **L** 25 - 60 (-70) cm; **Inf** 2 - 4.5 m, scape 1.2 - 2.5 m, flowering part 0.2 - 2 m; **Fl** 3 - 4.5 (-5.2) cm; **Ov** 1.5 - 2.5 cm; **Sty** 3 - 10 mm; **Fr** moderately constricted, larger, 4.5 - 7.5 cm.

Y. arkansana Trelease (Annual Rep. Missouri Bot. Gard. 13: 63, tt. 30, 31, 83, fig. 7, 92, 1902). **T:** USA, Arkansas (Engelmann 182 [MO]). – **D:** USA (S-C, N and E Texas, C and NE Oklahoma, W to SW Arkansas); prairie plains or flat stony hills, dry slopes, 850 - 2000 m, flowers late April to mid-May. **I:** Hochstätter (1999a).

Incl. *Yucca angustifolia* var. *mollis* Engelmann (1873) ≡ *Yucca glauca* var. *mollis* (Engelmann) Branner & Coville (1888); **incl.** *Yucca arkansana* var. *paniculata* McKelvey (1947) ≡ *Yucca louisianensis* var. *paniculata* (McKelvey) Shinnars (1956).

[3e] Acaulescent or stems short, to 15 cm; **Ros** 1 or several in small and lax groups, asymmetrical; **L** ascending, or sometimes somewhat recurved, base ± stiff, major part flexible and weak, 20 - 60 (-100) × 1 - 2.5 (at the base 0.3 - 0.7) cm, broader in the middle, straight, upper face flat, somewhat concave at the tip, lower face convex, margins whitish at first, papery, with short curled fibres, with age almost fibreless, terminal **Sp** acute, straw-coloured; **Inf** 0.6 - 1 (-2) m, **Fl**-bearing part starting at the height of the **L**, lower part little-branched and with few **Fl**; **Fl** campanulate or nearly tubular, 3 - 6 cm, whitish-cream, somewhat tinged with greenish or reddish; **Tep** elliptic to oblong or lanceolate, 2 - 5 cm broad, margins irregular, sometimes roughly dentate, tomentose; **Ov** oblong to cylindrical, thickly robust; **Fr** dry capsules, oblong, cylindrical, constricted in the middle, walls thick, 4 - 6.5 (-7) × 2 cm; **Se** black, shiny, 1 × 0.5 cm.

A variable taxon. *Y. arkansana* var. *paniculata* from the E range may be an E extension of the species with a taller paniculate inflorescence (McKelvey 1947). It appears to approach *Y. louisianensis* and is also included in the synonymy of the latter by some authors such as Kartesz (1996) and USDA (2001).

Y. baccata Torrey (in Emory, Rep. US Mex. Bound. 2(1): 221, 1859). **T** [lecto]: USA, New Mexico (Bigelow s.n. [NY]). – **Lit:** Reveal (1977). **D:** S USA, NW Mexico.

Incl. *Yucca filamentosa* Wood (1868) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca fragilifolia* Baker (1870); **incl.** *Yucca scabrifolia* Baker (1870); **incl.** *Yucca filifera* hort. ex Engelmann (1873).

For details of the typification see Reveal (1977). An ethnobotanical study of the species was presented by Potter-Bassano (1991).

Y. baccata var. **baccata** – **Lit:** Reveal (1977: with ills.). **D:** S USA (SE California, S Nevada, S Utah, N Arizona, Colorado, Texas), NW Mexico (N Chihuahua); dry slopes, 250 - 2000 m, flowers April to June. **I:** Matuda & Piña Lujan (1980).

Incl. *Yucca baccata* fa. *parviflora* McKelvey (1938).

[1b] Acaulescent or rarely with short stems; **Ros** asymmetrical and rather open, mostly simple and (50-) 60 - 75 × 130 - 150 cm, or clumped and 1 - 5 m Ø; **L** at the base spreading, central **L** more erect, straight, deeply canaliculate, rigid, (30-) 50 - 70 (-75) × 2.5 - 4 (flattened 3 - 6) cm, dark green, margins of the upper ½ separating, forming broad coarse recurved to curly fibres, **L** tip with a stout terminal **Sp**, stiff, 1.5 - 7 mm; **Inf** erect, short, as long as or longer than the **L**, to 1.3 m, scape and axis mostly green, with ± 15 part-**Inf**; **Ped** 0.7 - 4 cm; **Fl** pendent, campanulate, 6 - 13 cm; **Tep** lanceolate, 4 - 10 cm, dorsally red-brown, ventrally creamy-white, tube 7 - 12 mm; **Ov** (3-) 5 - 7 (-7.5) cm; **Fr** fleshy berries, ellipsoid, (10-) 15 - 17 × (3-) 5 - 6.5 cm, upper ½ constricted; **Se** 7 - 11 mm.

Y. baccata var. **vespertina** McKelvey (Yuccas Southwest US 1: 45, 1938). **T:** USA, Arizona (*McKelvey* 2167 [A]). – **Lit:** Reveal (1977: with ills.). **D:** S USA (SE California, S Nevada, S Utah, Arizona). **Fig. IX.b**

≡ *Yucca vespertina* (McKelvey) S. L. Welsh (1993).

[1b] Differs from var. *baccata*: **L** falcate, rather narrow, blue-green, glaucous, marginal fibres fine, wiry; **Inf** shorter to just slightly longer than the **L**, scape and axis mostly reddish-purple, with few part-**Inf**.

A poorly defined taxon according to several authors.

Y. baileyi Wooton & Standley (CUSNH 16: 114, 1913). **T:** USA, New Mexico (*Standley* 7638 [US 686602]). – **Lit:** Webber (1953); Reveal (1977: with ills.); Hochstätter (2000b). **D:** SW USA.

Based on its relatively small rosettes with narrow green strongly filiferous leaves, as well as on the distribution area, *Y. baileyi* appears to be related to *Y. elata* and *Y. angustissima* (Hochstätter 2000b).

Y. baileyi var. **baileyi** – **D:** SW USA (SE Utah, S Colorado, NE Arizona, E New Mexico); dry forest floors to grasslands, infrequent on exposed sandstone rims, 1200 - 2400 m, flowers April to June. **I:** Hochstätter (2000b).

Incl. *Yucca standleyi* McKelvey (1947).

[3b] Acaulescent; **Ros** solitary or 3 - 15 in clumps of 0.5 - 2 m Ø, branching from subterranean stems; **L** somewhat crowded, divergently spreading, somewhat rigid to flexible, linear, upper face flat, lower face convex, (20-) 25 - 60 (-100) × 0.3 - 0.8 cm, pale or yellow green, margins entire, white,

becoming separate and forming conspicuous fine curly fibres, tip gradually tapering towards a short terminal **Sp** 3 - 5 mm long; **Inf** racemose, simple, scape 1 - 10 cm, glabrous, **Fl**-bearing for up to 50 cm, included or just barely exceeding the **L**; **Ped** 1 - 2 cm; **Fl** pendent, campanulate to globose, 5 - 6.5 cm; **Tep** ovate to obovate, greenish-white, usually deeply tinged with purple esp. on the outer face, tube 3 - 7 mm; **Ov** 2 - 2.5 cm; **Fr** dry capsules, oblong-cylindrical, 4 - 7 × 2.5 - 5 cm, not or only slightly constricted; **Se** thin, with broad marginal wing, 6 - 10 mm.

Y. baileyi var. **intermedia** (McKelvey) Reveal (in Cronquist & al., Intermountain Fl. 6: 532, 1977). **T:** USA, New Mexico (*McKelvey* 4902 [A]). – **D:** SW USA (C New Mexico); 1500 - 2000 m.

≡ *Yucca intermedia* McKelvey (1947) ≡ *Yucca baileyi* ssp. *intermedia* (McKelvey) Hochstätter (1999); **incl.** *Yucca intermedia* var. *ramosa* McKelvey (1947).

[3b] Differs from var. *baileyi*: Stems short, erect.

Webber (1953) assumed a hybrid origin for *Y. intermedia*, which is rejected by Reveal (1977) because of the high degree of viable pollen set, the production of mature fruits, and the lack of any of the putative parents as suggested by Webber in its distribution area.

Y. baileyi var. **navajoa** (J. M. Webber) J. M. Webber (Yuccas Southwest, 51, 1953). **T:** USA, New Mexico (*Webber* s.n. [US 1872608]). – **D:** S USA (Arizona, New Mexico); chapparral and juniper woodlands on coarse gravelly soils or sandstone ledges, 1580 - 1980 m, flowers usually early June.

≡ *Yucca navajoa* J. M. Webber (1945).

[3b] Differs from var. *baileyi*: Subcaulescent; **Ros** forming dense clumps mainly through branching of the above-ground stems, smaller, more symmetrical; **L** shorter, 11 - 41 × 0.8 cm, broader in comparison to the length; **Se** without broad marginal wing.

Y. brevifolia Engelmann (in S. Watson, Bot. US Geol. Expl. 40. Parallel, 5: 496, 1871). **T** [lecto]: USA, California (*Bigelow* s.n. [NY, PANS, US]). – **Lit:** Reveal (1977); Benson & Darrow (1981); both with ills. **D:** SW USA.

≡ *Clistoyucca brevifolia* (Engelmann) Rydberg (1918); **incl.** *Yucca brevifolia* fa. *kernensis* Hochstätter (2000) (*nom. inval.*, Art. 32.1c).

Y. brevifolia var. **brevifolia** – **D:** SW USA (SE California, S Nevada, SW Utah, W Arizona); dry slopes and mesas, 850 - 2200 m. **Fig. IX.c, IX.e**

Incl. *Yucca draconis* var. *arborescens* Torrey (1857) ≡ *Yucca arborescens* (Torrey) Trelease ex Merriam (1893) (*nom. illeg.*, Art. 52.1) ≡ *Clistoyucca arborescens* (Torrey) Trelease (1902) (*nom. illeg.*, Art. 52.1); **incl.** *Yucca brevifolia* fa. *herbertii* J.

M. Webber (1953) $\equiv$ *Yucca brevifolia* var. *herbertii* (J. M. Webber) Munz (1958).

[2] Arborescent, to (3-) 5 - 12 (-15) m, frequently with a single main trunk, **Br** usually from 1 - 3 m above the ground; **Ros** broad, flat- or round-topped, 0.3 - 1 (-1.5) $\times$ 0.3 - 0.5 m; **L** straight, upper face plane and lower face convex, or triquetrous, rigid, 15 - 35 $\times$ 0.7 - 1.5 cm, green, base whitish, tip with a stiff **Sp** 7 - 12 mm long, margins entire, thin, horny, minutely denticulate; **Inf** erect, short, (25-) 30 - 55 cm, broad, densely flowered, with numerous part-**Inf**; **Ped** 0.7 - 1.2 (-2.5) cm; **Fl** ellipsoid to globose, (3-) 4 - 7 cm; **Tep** lanceolate to oblong, greenish-white to cream-coloured, tube at least $\frac{1}{2}$ of the length of the **Tep**; **Ov** 2.5 - 3 cm; **Fr** dry, indehiscent, ellipsoid, rather spongy, 6 - 8.5 (-10) $\times$ 3 - 5 (-6.5) cm; **Se** flat, thin, 8 - 11 mm, dull black.

For details of the typification see Reveal (1977). This taxon is one of the characteristic elements of the Mohave Desert of the SW USA, where it often dominates the landscape. Vernacular name: "Joshua Tree".

Y. brevifolia var. *jaegeriana* McKelvey (J. Arnold Arbor. 16: 269, 1935). **T:** USA, California (*McKelvey* 2732 [A]). – **D:** SW USA (SE California, S Nevada, SW Utah, W Arizona); hills and alluvial fans of the Upper Mojave Desert, 850 - 1500 m.

Incl. *Yucca brevifolia* var. *wolfei* Jones (1935) (*nom. inval.*, Art. 29.1).

[2] Differs from var. *brevifolia*: Stems smaller, mostly 1.8 - 3.6 (-4.5) m, trunks mostly < 37.5 cm $\varnothing$; lowest **Br** usually within 0.9 m above the ground; **L** mostly 10 - 20 (-25) $\times$ 0.6 - 1 cm.

This taxon is a variant of smaller growth from the Upper Mojave Desert. It intergrades with var. *brevifolia* and is thus placed in the synonymy of the latter by Reveal (1977) and McKinney & Hickman (1993), but is otherwise kept separate by Kartesz (1996) and USDA (2001).

Y. campestris McKelvey (Yuccas Southwest US 173, t. 62-63, 1947). **T:** USA, Texas (*McKelvey* 2849 [A]). – **D:** USA (W Texas); sand dunes. **I:** Hochstätter (1999a); Hochstätter (2000b).

[3f] Acaulescent or stems short, 0.5 - 1 m; **Ros** in small to large and dense groups, lax; **L** upper face flat, lower side convex, to 65 $\times$ 0.6 (in the middle) cm, bluish-green, margins white to grey, finely fibrous, later glabrous; **Inf** 0.5 - 1.5 (-2) m, **Fl**-bearing part starting between (rarely above) the **L**, part-**Inf** many, thin, fragile, ascending; **Fl** globular, 10 - 12 cm; **Tep** 1.5 - 2.5 cm broad, upper margin irregular, toothed, slightly tomentose, fading greenish, sometimes somewhat tinged with rose; **Ov** oblong-ovoid, 1.2 - 2 cm; **Fr** dry capsules, symmetrical or constricted, 4 - 5 $\times$ 3 - 4.5 cm, reddish-brown, aged grey; **Se** black, shiny, large, 1 $\times$ 1 cm.

The species occurs in dense stands in a relatively small area (Hochstätter l.c.).

Y. capensis L. W. Lenz (CSJA 70(6): 289-293, ill., 1998). **T:** Mexico, Baja California Sur (*Lenz* 4501 [RSA]). – **D:** Mexico (Baja California Sur: Cape region); thorn scrub or tropical deciduous forest, 0 - 1000 m.

[1c] Stems 1 - 5.5 m, solitary, or plants becoming rhizomatous and group-forming with several un- or few-branched stems from the base, in age often decumbent; **L** narrowed above the expanded base, canaliculate in the middle, flat distally, rather thin, flexible, to 100 $\times$ 5 cm, margins dark grey, smooth to somewhat scabrous, without fibres, tip sharp but without a distinct terminal **Sp**; **Inf** broadly ellipsoid, many-flowered, scape short, not exceeding the **L**, densely tomentose to glabrous; **Fl** flat or saucer-shaped to more subglobose, to 10 cm $\varnothing$; **Tep** elliptic, abruptly attenuate to the narrow tips, to 5 $\times$ 2.5 - 3 cm, cream-coloured; **Fr** fleshy berries, pendent, oblong-cylindrical, 5 $\times$ 11.5 cm; **Se** unknown.

According to the protologue, the species was formerly confused with the widespread coastal *Y. valida*, but differs clearly in its long wide leaves without fibrous margins, and long slender stems eventually falling down, as was first noted by Lenz (1992). It is regarded as being related with a group of mountain-dwelling mainland yuccas (*Y. schottii* auct., *Y. madrensis* and *Y. jaliscensis*).

Y. carnerosana (Trelease) McKelvey (Yuccas Southwest US 1: 24, t. 6-7, 1938). **T:** Mexico, Coahuila (*Pringle* 3912 [MO]). – **Lit:** Webber (1953); Matuda & Piña Lujan (1980: with ill.). **D:** SE USA (Texas: S-C Brewster County), NW Mexico (Chihuahua, Coahuila, Zacatecas, San Luis Potosí, Nuevo León, Tamaulipas); dry slopes in desert scrub or pine-oak forest, 850 - 2200 m, flowers March to April.

$\equiv$ *Samuela carnerosana* Trelease (1902).

[1a] Stems generally simple (very rarely 1- or 2-times branched in the upper part), sometimes forming groups of stems united at the base, 1.5 - 6 (to $\geq$ 10) m; **L** rigid, constricted near the base, 50 - 100 $\times$ 5 - 7.5 cm, bluish-green, margins richly filiferous; **Bra** persistent, white; **Inf** with large and strong scape, ellipsoid, exerted from the **L**, densely branching; **Fl** 45 - 90 mm, strongly scented; **OTep** 67 - 94 $\times$ 13 - 21 mm, **ITep** 65 - 93 $\times$ 20 - 28 mm, tube 17 - 30 mm; **Ov** 6 - 9 mm $\varnothing$; **Fr** fleshy berries, oblong, 5 - 7.5 $\times$ 4 cm; **Se** 7 - 9 $\times$ 8 - 10 mm.

Y. coahuilensis Matuda & Piña Lujan (Pl. Mex. Gen. Yucca, 120-122, ill., 1980). **T:** Mexico, Coahuila (*Matuda* 38790 [UNAM]). – **D:** Mexico (Coahuila); grassland and small-leaved desert scrub, $\pm$ 360 m, flowers May to June.

[3a] Acaulescent; **L** many, canaliculate, 73 - 80 $\times$ 1 - 1.2 cm, margins white or greyish, hardly filiferous, terminal **Sp** very pungent; **Inf** 2.2 - 2.5 m; **Tep** lanceolate or ovate-lanceolate, to 40 $\times$ 12 - 16

mm, white; **Ov** cylindrical, 22 mm; **Fr** dry capsules, oblong-globose, to 7×3.5 cm.

Y. constricta Buckley (Proc. Acad. Nat. Sci. Philadelphia 1862: 8, 1863). **T**: USA, Texas (Buckley s.n. [PH?]). – **Lit**: Webber (1953); Hochstätter (2000b); both with ills. **D**: USA (Texas); 280 - 1230 m.

Incl. *Yucca glauca* var. *constricta* Hort. Mesa Garden (s.a.) (*nom. inval.*, Art. 30.3); **incl.** *Yucca angustifolia* Carrière (1860) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca albo-spica* hort. ex van Houtte (1867) (*nom. inval.*, Art. 32.1c?); **incl.** *Yucca polyphylla* Baker (1870).

[3c] Acaulescent or stems sometimes to 1 (-1.5) m; **Ros** in small to larger lax groups, with 100 - 200 **L**; **L** grass-like, flexible, weak, sometimes appearing somewhat stiff, narrow at the base, broader in the middle, $20 - 50 \times 1 - 2.5$ cm, light to dark green, bluish-green, margins white, old grey to green, fibrous, curly but fibres soon eroding away, terminal **Sp** sharp; **Inf** 2.5 (-3) m, scape often longer than the **Fl**-bearing part, **Fl** high above the **L**, part-**Inf** from just at the base, with few to many ascending spreading **Br**; **Fl** tubular, 25 - 40 mm; **Tep** elliptic, thin, acute, pale greenish-white; **Ov** oblong-cylindrical, 2 cm; **Fr** dry capsules, oblong-cylindrical, $3 - 4.5 \times 1.5 - 2$ cm; **Se** black, 0.8×0.5 cm.

Hochstätter (2000b) suggested that this species and *Y. campestris* (both dry-fruited) exhibit close affinities with the Yuccas of the E USA (*Y. filamentosa*, fruits dry; *Y. gloriosa*, fruits corky; *Y. recurvifolia*, fruits fleshy) based on their usually broader sharper grass-like leaves, and similar shape and colour of the style.

Y. decipiens Trelease (Annual Rep. Missouri Bot. Gard. 18: 228, 1907). **T**: Mexico, San Luis Potosí (*Anonymus* s.n. [MO?]). – **Lit**: Matuda & Piña Lujan (1980: with ills.). **D**: Mexico (Durango, Zacatecas, San Luis Potosí, Jalisco, Aguascalientes, Guanajuato); well-drained plains with deep soil, 1800 - 2400 m.

[1c] Arborescent, stems to 15 m, **Br** numerous, to 90; **L** linear-ensiform, nearly plane, not very rigid, to 58×2.5 cm, shiny on both faces, margins with numerous curled greyish fibres; **Inf** scape overtopping the **L**, **Inf** $\pm$ conical, erect or somewhat curved, to 1 m; **Ped** to 2.5 cm; **Fl** many; **Tep** $40 - 55 \times 11 - 18$ mm; **Fr** fleshy berries, pendent, oblong, $5 - 8.8 \times 2.5 - 3.2$ cm, rostrate; **Se** 8×2 mm.

Y. declinata Laferrière (CSJA 67(6): 347-348, ills., 1995). **T**: Mexico, Sonora (Gentry 16615 [ARIZ 267477, ARIZ, US]). – **D**: Mexico (Sonora), open woodland, volcanic and limestone soils.

[1b] Arborescent, stems thick, robust, 3 - 6 m, branching and forming a crown, suckering at the base when fully grown; **L** deflexed towards the stem, straight, canaliculate, $50 - 140 \times 5 - 6$ cm, yel-

lowish-green, margins smooth, with age becoming frayed into threads; **Inf** 1 - 1.3 m, glabrous, usually inclined; **Fl** small; **Tep** lanceolate, $4 - 5 \times 0.8 - 1.2$ cm, white; **Fil** pubescent, 1.1 - 1.8 cm; **Ov** elongate, 3.5 - 5 cm; **Fr** indehiscent, oblong, tapering at the base, 15 - 20 cm; **Se** flat, slightly ovoid, 1 - 1.5 cm $\varnothing$, black.

The type collection was previously tentatively identified as *Y. grandiflora* by Gentry (1972: 162). Since Gentry's fieldnotes indicated that he considered the plant significantly different from its close relatives *Y. grandiflora* and *Y. arizonica*, Laferrière formally described the plant based on Gentry's specimens and notes. According to the protologue, *Y. declinata* is most distinctive in its horizontally oriented inflorescences. In addition, it differs from *Y. grandiflora* in its smaller flowers and glabrous rachis, from *Y. arizonica* (here treated as synonym of *Y. xschottii*) in its taller habit, larger leaves, and more open inflorescences with flowers with shorter tepals and shorter stamens, and from *Y. schottii* auct. by its elongate ovary and glabrous inflorescence.

Y. elata Engelman (Bot. Gaz. (Crawfordsville) 7: 17, 1882). **T** [lecto]: USA, Arizona (Rothrock 382 [US]). – **Lit**: Webber (1953); Reveal (1977); Matuda & Piña Lujan (1980); all with ills. **D**: SW USA, NW Mexico.

Reveal (1977) placed under *Y. elata* all those plants from the SW USA with paniculate inflorescences with only the uppermost flowers arranged in racemes. These plants are almost always caulescent, in contrast *Y. angustissima*, which includes plants that are generally acaulescent and have inflorescences that are almost always strictly racemose. *Y. elata* is easily recognizable in its native range by its elegant crown of narrow flexible finely filiferous leaves with thin white margins on well-developed trunks (Gentry 1972).

Webber (1953) assumes hybridization with *Y. glauca*, *Y. constricta* and *Y. baileyi* wherever they co-occur.

Y. elata var. *elata* – **D**: USA (S Arizona, S and C New Mexico, W Texas), N Mexico (N Chihuahua); desert places on sandy and gravelly soils, $\pm 500 - 2000$ m, flowers April to June.

Incl. *Yucca elata* var. *magdalenae* Hort. Mattern (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Yucca angustifolia* var. *radiosa* Engelman (1871) $\equiv$ *Yucca radiosa* (Engelman) Trelease (1902); **incl.** *Yucca angustifolia* var. *elata* Engelman (1873) (*nom. illeg.*, Art. 52.1).

[3b] Arborescent with 1 to several stems 0.3 - 4.5 m tall, often branched above, solitary or in large clumps; **Ros** large; **L** numerous, divergent, finally reflexing and persisting as a dry skirt on the trunk, narrowly linear, lower face convex, upper face flat, striate, $30 - 90 \times 0.5 - 0.7$ (-1.3) cm, pale to yellow-

green, margins white to greenish-white, finely filiferous, tip long acuminate with a short **Sp**; **Inf** scape 0.5 - 1.5 (-2) m, glabrous, green to reddish or yellowish, relatively slender, extending well beyond the **L**, flowering part 0.5 - 1.5 (-3) m, ellipsoid, paniculate; **Ped** (0.7-) 1 - 2.5 cm; **Fl** pendent, campanulate to somewhat globose; **Tep** ovate to obovate or broadly elliptic, 35 - 50 × 15 - 25 mm, **ITep** broader, white to cream-coloured, or tinged with green or pink, tube 2 - 7 mm; **Ov** oblong-cylindrical, with deep **Ca** sutures, abruptly terminating in a **Sty** of 15 - 20 × ± 8 mm; **Fr** dry capsules, oblong-cylindrical, rather thin-walled, 5 - 8 × 3 - 6 cm, smooth, whitish; **Se** 7 - 10 × 9 - 14 mm. - *Cytology*: n = 30.

Y. elata var. **utahensis** (McKelvey) Reveal (in Cronquist & al., Intermountain Fl. 6: 533, 1977). **T**: USA, Utah (McKelvey 4167 [A]). - **D**: SW USA (SW Utah, N Arizona); 850 - 2200 m, flowers late April to early June.

≡ *Yucca utahensis* McKelvey (1947) ≡ *Yucca elata* ssp. *utahensis* (McKelvey) Hochstätter (1999).

[3b] Differs from var. *elata*: Acaulescent or more often caulescent with procumbent stems of 0.6 - 1.3 m; **L** 20 - 70 × 0.7 - 2 cm; **Ov** 2.5 - 3.5 cm; **Fr** 5 - 6 cm.

Webber (1953) interpreted this and the following variety as hybrid populations. This is regarded as being unjustified by Reveal (1977).

Y. elata var. **verdiensis** (McKelvey) Reveal (in Cronquist & al., Intermountain Fl. 6: 533-534, 1977). **T**: USA, Arizona (McKelvey 2752 [A]). - **D**: SW USA (C and S Arizona); 900 - 2000 m, flowers May to mid-June.

≡ *Yucca verdiensis* McKelvey (1947) ≡ *Yucca elata* ssp. *verdiensis* (McKelvey) Hochstätter (2000).

[3b] Differs from var. *elata*: Caulescent, stems distinct but short; **L** shorter, 25 - 45 × 0.4 - 0.7 (-1.3) cm; **Ov** 2 - 2.5 cm; **Fr** smaller, 4 - 4.5 cm.

Y. elephantipes Regel (Gartenflora 9: 35, 1859). - **Lit**: Lott & García-Mendoza (1994). **D**: Mexico (Chiapas), Guatemala (probably cultivated only).

Incl. *Yucca guatemalensis* Baker (1872); **incl.** *Yucca ghiesbreghtii* hort. ex Baker (1880); **incl.** *Yucca gigantea* Baker (1880); **incl.** *Yucca lenneana* Baker (1880); **incl.** *Yucca mooreana* Hort. Peacock ex Baker (1880); **incl.** *Yucca roezlii* hort. ex Baker (1880); **incl.** *Yucca mazellii* hort. ex W. Watson (1889).

[1c] Arborescent, stems 3 - 10 m, numerous from a thickened-inflated trunk-like base, slender and densely branched in the upper parts; **L** patent, narrowed to 1.5 - 2 cm above the base, flat or slightly canaliculate, (35-) 50 - 100 × 5 - 7 cm, brilliant dark green, tip acute, margins finely denticulate, with a yellow border; **Inf** paniculate, erect, dense,

surpassing the **L** only with the upper ¼; **Fl** pendent, globose; **Tep** narrowly ovate; **ITep** somewhat broader than the **OTep**, 30 - 50 × (10-) 15 - 20 mm, white to whitish; **Fil** 8 - 10 mm; **Ov** oblong, not constricted at the base, 10 - 15 mm; **Fr** fleshy berries, ellipsoid, 7 - 8 × 4.5 cm, pulpa greenish to whitish; **Se** 8 - 10 mm.

Widely cultivated as an ornamental in (sub-) tropical gardens. The flowers are reportedly edible. Lott & García-Mendoza (1994) and USDA (2001) apparently erroneously used the younger synonym *Y. guatemalensis* for this species.

Y. endlichiana Trelease (Annual Rep. Missouri Bot. Gard. 18: 229, t. 15-17, 1907). **T**: Mexico, Coahuila (*Endlich* s.n. [MO]). - **D**: Mexico (Coahuila); arid Chihuahuan Desert scrub, ± 1200 m. **I**: Matuda & Piña Lujan (1980). **Fig. IX.d**

[1b] Acaulescent; **Ros** rhizomatous, surculose; **L** few, erect, rigid, thick, semicircular in cross-section at the base, conduplicate further up, to 50 × 1.5 cm, bluish-green, brown-reddish at the base, margins finely fibrous, chestnut-brown, terminal **Sp** conical, short; **Inf** much shorter than the **L**, part-**Inf** with up to 6 **Fl**; **Ped** filiform, 2.5 cm; **Per** whitish, outside with brownish-red tinge, tube ovate, acute, 18 × 5 mm; **Fil** short, finely papillose; **Ov** oblong; **Fr** fleshy berries, pendent, subglobose to narrowly ellipsoid, 3 × 2 - 2.5 cm; **Se** 5 × 6 - 7 mm.

This is possibly the most succulent species of *Yucca*. It certainly is very desirable and suitable for collections due to its small size.

Y. faxoniana (Trelease) Sargent (Man. Trees [ed. 1], 121, fig. 106, 1905). **T**: USA, Texas (*Anonymus* s.n. [A?, MO?]). - **D**: SE USA (Texas), N Mexico (Chihuahua, Coahuila); dry slopes in desert scrub, 500 - 1500, flowers March to April. **Fig. IX.f, X.a**

≡ *Samuela faxoniana* Trelease (1902); **incl.** *Yucca australis* Trelease (1894) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca macrocarpa* Sargent (1895) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca australis* var. *valida* M. E. Jones (1929) (*nom. inval.*, Art. 43.1).

[1a] Stems simple, rarely branched 1 - 2× in the upper part, sometimes forming dense groups branched at the base, 2 - 6.5 m; **L** rigid, constricted near the base, 85 - 120 × 5 - 7.5 cm, bluish-green, margins richly filiferous; **Bra** persistent, white, sometimes rose-coloured; **Inf** with a short strong scape, exceeding the **L** for ½ - ¾, narrowly conical, openly branched; **Fl** 4 - 7 cm; **OTep** 55 - 87 × 15 - 17 mm, **ITep** 54 - 85 × 19 - 20 mm, tube 10 - 18 mm; **Ov** narrowly ovoid, 6 - 8 mm Ø; **Fr** fleshy berries, beaked, with adhering **Tep** remains, 3 - 9 × 2.5 - 3 cm; **Se** rough, 5 - 8 × 7 - 10 mm.

Y. filamentosa Linné (Spec. Pl. [ed. 1], 319, 1753). - **D**: E USA (New Jersey, Maryland, Virginia, West Virginia, North Carolina, Tennessee, South Carolina, Georgia, Florida, Alabama, Mississippi, Loui-

siana); sandy soils, flowers from mid-spring to early summer.

Incl. *Yucca glauca* Noisette ex Sims (1826) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca filamentosa* var. *mexicana* S. Schauer (1847); **incl.** *Yucca filamentosa* var. *recurvifolia* Alph. Wood (1861); **incl.** *Yucca exigua* Baker (1871); **incl.** *Yucca filamentosa* var. *grandiflora* Baker (1872); **incl.** *Yucca filamentosa* var. *angustifolia* Engelm. (1873); **incl.** *Yucca filamentosa* var. *bracteata* Engelm. (1873); **incl.** *Yucca filamentosa* var. *laevigata* Engelm. (1873); **incl.** *Yucca filamentosa* var. *latifolia* Engelm. (1873); **incl.** *Yucca filamentosa* fa. *genuina* Engelm. (1873) (*nom. inval.*, Art. 24.3); **incl.** *Yucca antwerpensis* hort. ex Baker (1880).

[3g] Stems (almost) none, hidden by the **L** when present; **Ros** stoloniferous, clump-forming; **L** erect to spreading and recurved, oblanceolate, flexible, very clearly narrowed towards the base, rather abruptly tapering towards the tip, 50 - 75 × 2 - 4 cm, green or slightly glaucous, margins inrolled at the tip, otherwise splitting into stout curled fibres; **Inf** to 4.5 m, **Fl**-bearing part well above the **L**; **Fl** pendent, campanulate, 5 - 7 cm; **Tep** abruptly mucronate, 5 - 7 cm, white tinged with green, yellow or cream; **Fr** dry capsules, oblong, 3.8 - 5 × 2 cm; **Se** thin, flat, winged, 6 mm.

Very close to and possibly not distinct from *Y. flaccida* (see there for differences). Hardy outdoors in C Europe and therefore widely cultivated in many selections, including variegated forms.

Y. filifera Chabaud (Rev. Hort. 48: 432-434, 1876). **Nom. illeg.**, Art. 53.1. – **Lit:** Matuda & Piña Lujan (1980: with ill.); McVaugh (1989: with ill. as *Y. australis*). **D:** C Mexico (Chihuahua, Coahuila, Nuevo León, S Zacatecas, San Luis Potosí, Aguascalientes, NE Jalisco, Tamaulipas, Guanajuato, Querétaro, Hidalgo, Michoacán, México); plains with arid desert scrub, 500 - 2400 m, flowers January to March.

≡ *Yucca canaliculata* var. *filifera* (Chabaud) Fenzl (1889); **incl.** *Yucca baccata* var. *australis* Engelm. (1873) ≡ *Yucca australis* (Engelm.) Trelease (1892).

[1c] Arborescent, stems to 10 - 13 m tall, much-branched, old plants with up to 40 **Br**, trunk short, to 1.5 m Ø; **L** linear-oblanceolate, constricted near the base, rigid, generally asperous on both faces, 30 - 60 × 2 (-3.5) cm, margins with numerous spiralled white fibres, esp. on young **L**, terminal **Sp** stout, 1 - 3 cm, dark; **Inf** pendent, 0.6 - 1.5 m, ± cylindrical, obscurely puberulent to glabrous; **Ped** to 2.7 cm; **Per** white; **OTep** 30 - 52 × 7 - 25 mm, **ITep** somewhat broader; **Fil** 10 - 15 mm; **Ov** 18 - 20 × 4 - 5 mm; **Fr** fleshy berries, pendent, oblong, 5 - 8.8 × 2.7 - 3.3 cm, beak 0.2 - 0.7 cm, with the flavour and consistency of dates; **Se** somewhat rugose, 8 × 2 mm.

This name is unfortunately a later homonym of *Y.*

filifera hort. ex Engelm. 1873. McVaugh (1989) used the name *Y. australis* instead, but in order to avoid a name change, *Y. filifera* Chabaud should be proposed for conservation.

This is the most widely distributed species and it forms an important element of the tree stratum of the (Chihuahuan) desert scrub of C Mexico (Matuda & Piña Lujan l.c.).

Y. flaccida Haworth (Suppl. Pl. Succ., 34, 1819). – **D:** E USA (Texas, Oklahoma, Missouri, Arkansas, Louisiana, Tennessee, Mississippi, Alabama, Georgia, North Carolina, South Carolina, Florida); (semi-) open sites in pine scrub or woodland and coastal sands, flowers in spring.

≡ *Yucca filamentosa* var. *flaccida* (Haworth) Engelm. (1873) ≡ *Yucca filamentosa* fa. *flaccida* (Haworth) Voss (1895); **incl.** *Yucca concava* Haworth (1819) ≡ *Yucca filamentosa* var. *concava* (Haworth) Baker (s.a.) ≡ *Yucca filamentosa* fa. *concava* (Haworth) Voss (1895); **incl.** *Yucca glaucescens* Haworth (1819) ≡ *Yucca filamentosa* var. *glaucescens* (Haworth) Baker (s.a.) ≡ *Yucca flaccida* var. *glaucescens* (Haworth) Trelease (s.a.) ≡ *Yucca filamentosa* fa. *glaucescens* (Haworth) Voss (1895); **incl.** *Yucca puberula* Haworth (1828) ≡ *Yucca filamentosa* var. *puberula* (Haworth) Baker (s.a.) ≡ *Yucca filamentosa* fa. *puberula* (Haworth) Voss (1895); **incl.** *Yucca orchiioides* Carrière (1861) ≡ *Yucca filamentosa* fa. *orchiioides* (Carrière) Voss (1895); **incl.** *Yucca orchiioides* var. *major* Baker (1877) ≡ *Yucca flaccida* var. *major* (Baker) M. L. Rehder (s.a.); **incl.** *Yucca smalliana* Fernald (1944) ≡ *Yucca filamentosa* var. *smalliana* (Fernald) Ahles (1964).

[3g] Acaulescent or stems short; **Ros** stoloniferous, clump-forming, dying slowly after flowering; **L** lanceolate, erect, gradually tapering towards the tip, flattened, glabrous, arching or curved in the middle with age, 40 - 80 × 1 - 4 (-5) cm, margins filiferous, terminal **Sp** pungent; **Inf** 0.9 - 4.25 m, scape 0.5 - 2.75 m, glabrous or pubescent; **Ped** 1.5 - 3 cm; **Fl** 4 - 5 cm; **Ov** 15 mm, pale green; **Tep** lanceolate to elliptic, tip obtuse, 3 - 5 × 1 - 3 cm, white, creamy-white or light greenish-white; **Fr** dehiscent capsules, oblong, inversely pear-shaped or conical, to 3.5 - 4 × 1.5 - 2 cm; **Se** 6 - 8 × 5 - 6 mm.

Very close to and probably better regarded as a variety of *Y. filamentosa*, from which it differs mainly in minor morphological features (thinner and narrower leaves and smaller, narrower flowers vs. thick and stiff leaves and larger flowers in the latter).

Y. glauca Nuttall (Cat. Pl. Upper Louisiana no. 89, 1813). **T** [neo]: USA, Montana (*Hochstätter* 1178.69 [SRP]). – **D:** S Canada, USA.

Hochstätter (1998: 74) provided a somewhat cryptic neotypification for this name. He later listed

this neotype under *Y. glauca* [fa.] *montana* Hochstätter 1998 (*nom. nud.*).

Y. glauca var. **glauca** – **Lit:** Webber (1953); Hochstätter (2000b); both with ills. **D:** S Canada (S Alberta), USA (Montana, North Dakota, South Dakota, Minnesota, Wyoming, Nebraska, Iowa, Colorado, Kansas, Missouri, Texas, Oklahoma, Arkansas, Louisiana); common in Great Plains grasslands, badlands and mountains, 800 - 2600 (-2800) m, flowers May to July.

Incl. *Yucca glauca* var. *arkansana* Hort. Mesa Garden (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Yucca glauca* var. *baileyi* Hort. Mesa Garden (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Yucca glauca* var. *elata* Hort. Mesa Garden (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Yucca glauca* var. *radiosa* Hort. Mesa Garden (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Yucca angustifolia* Pursh (1814); **incl.** *Yucca glauca* var. *rosea* D. M. Andrews (1934); **incl.** *Yucca glauca* fa. *montana* Hochstätter (1998) (*nom. inval.*, Art. 32.1c); **incl.** *Yucca glauca* ssp. *albertana* Hochstätter (2000).

[3f] Acaulescent or stems short to 30 cm; **Ros** first single but soon clumped, groups dense, 0.8 - 2.5 m Ø; **L** divergently spreading, linear, upper face flat, lower face convex, occasionally triquetrous or nearly flat, flexible, striate, (20-) 50 - 70 × 0.5 - 1.1 cm, pale green or pallid, margins white or greenish-white, soon finely filiferous, terminal **Sp** short, acute, brownish; **Inf** (0.4-) 0.9 - 1.25 m, scape 24 - 53 cm, **Fl**-bearing part from between the **L**, part-**Inf** usually none or rarely few, abortive at the base; **Fl** globose or campanulate; **Tep** acute, 46 - 61 × 26 - 42 mm, greenish-white, commonly tinged with purple and shiny; **Ov** obovate, 20 × 9 - 13 mm, white or rarely greenish-white, abruptly terminating into the **Sty**; **Fr** dry capsules, oblong-cylindrical, 58 - 62 × 45 - 53 mm, beaked; **Se** 7 - 9 × 8 - 10 mm, with broad marginal wing, black.

The measurements given by Hochstätter (1998) partly differ considerably from those of Webber (l.c.) reproduced here. The species represents a characteristic element of the prairie grassland plains in the mid-western USA.

Y. glauca ssp. *albertana* differs in minor quantitative features only that fall well within the range given by Webber (l.c.). It might represent an artificial segregate for the smallest N-most form within the complex only, and is preliminarily included in the synonymy here.

Y. glauca var. **stricta** (Sims) Trelease (Annual Rep. Missouri Bot. Gard. 13: 61, tt. 25-27, 1902). **T** [neo]: USA, Kansas (McKelvey 2842 [A]). – **D:** USA (SE Colorado, SW Kansas, NE New Mexico, NW Oklahoma); 900 - 1500 m, flowers April to June. **I:** Hochstätter (1998).

≡ *Yucca stricta* Sims (1821) ≡ *Yucca angustifolia* var. *stricta* (Sims) Voss (1895) ≡ *Yucca glauca* ssp. *stricta* (Sims) Hochstätter (1999); **incl.** *Yucca glau-*

ca var. *gurneyi* McKelvey (1947) ≡ *Yucca glauca* ssp. *gurneyi* (McKelvey) Hochstätter (1999) (*nom. inval.*, Art. 29.1?).

[3f] Differs from var. *glauca*: Plants generally more robust; **L** to 75 cm; **Inf** larger, > 1.8 m, tip long, racemose; **Se** smaller, ± 8 × 4 mm.

Kartesz (1996) and USDA (2001) erroneously both use the younger synonym var. *gurneyi* for this taxon. Hochstätter (1998) selected a neotype.

Y. gloriosa Linné (Spec. Pl. [ed. 1], 319, 1753). – **D:** SE USA (North Carolina, South Carolina, Georgia); coastal dunes, flowers in spring.

Incl. *Yucca integerrima* Stokes (1812); **incl.** *Yucca obliqua* Haworth (1819) ≡ *Yucca gloriosa* fa. *obliqua* (Haworth) Voss (1895); **incl.** *Yucca rufocincta* Haworth (1819) ≡ *Yucca gloriosa* fa. *rubrocincta* (Haworth) Voss (1895); **incl.** *Yucca superba* Haworth (1819) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca acuminata* Sweet (1828) ≡ *Yucca gloriosa* fa. *acuminata* (Sweet) Voss (1895); **incl.** *Yucca gloriosa* var. *marginata* Carrière (1859); **incl.** *Yucca gloriosa* var. *tristis* Carrière (1859); **incl.** *Yucca gloriosa* var. *variegata* Carrière & Hort. Belg. (1859); **incl.** *Yucca japonica* hort. ex Carrière (1859); **incl.** *Yucca pendula* Sieber ex Carrière (1859); **incl.** *Yucca ellacombei* hort. ex Baker (1870); **incl.** *Yucca patens* André (1870); **incl.** *Yucca pruinosa* Baker (1870) ≡ *Yucca gloriosa* fa. *pruinosa* (Baker) Voss (1895); **incl.** *Yucca tortulata* Baker (1870) ≡ *Yucca gloriosa* fa. *tortulata* (Baker) Voss (1895); **incl.** *Yucca gloriosa* fa. *planifolia* Engelmänn (1873); **incl.** *Yucca gloriosa* fa. *plicata* Engelmänn (1873); **incl.** *Yucca gloriosa* var. *planifolia* Engelmänn (1873); **incl.** *Yucca gloriosa* var. *plicata* Engelmänn (1873); **incl.** *Yucca plicata* hort. ex C. Koch (1873); **incl.** *Yucca plicatilis* hort. ex C. Koch (1873); **incl.** *Yucca gloriosa* var. *genuina* Engelmänn (1873) (*nom. inval.*, Art. 24.3); **incl.** *Yucca gloriosa* var. *flexilis* Trelease (1902).

[1d] Stems woody, to 5 m, simple or rarely ultimately branched; **L** lanceolate, mainly stiff, erect, ascending or recurved, somewhat narrowed towards the base, flexible, flat or pleated near the tip, smooth, 40 - 70 × 4 - 6 cm, glaucous when young, green or bluish-green when old, margins entire or with a few inconspicuous denticles, opaque, brown, often becoming frayed; **Inf** large, erect, 1.65 - 2.7 m, to 45 cm broad, **Fl** starting 40 - 50 cm above the **L** tips; **Ped** to 2 cm; **Fl** pendent, campanulate; **Tep** oblong-lanceolate, 4 - 5 × 2 - 2.5 cm, greenish-white, cream-coloured or reddish; **Fr** berry-like, not fleshy and indehiscent-leathery, pendent, 6-ribbed, 5.5 - 8 cm; **Se** unwinged, lustrous, 5 - 7 mm Ø, black.

Y. gloriosa and its closest relative *Y. recurvifolia* (for differences see there) differ from all other species of Sect. *Yucca* in possessing indehiscent fruits, which are corky-leathery and not fleshy. In its growth habit, the species is similar to *Y. aloifolia*,

but its habitat is more mound-like due to the terminal branching mode in contrast to a branching more from the middle with a trunk thus appearing more open. Commonly cultivated in the S USA and persisting at old homesites. – Probably the most widely grown *Yucca* species with many cultivars, hybrids and selections. *Y. ellacombei* hort. ex Baker (1870) represents another name for the horticultural selection *Y. gloriosa* 'Nobilis'.

Y. grandiflora Gentry (Madroño 14: 51-53, 1957). **T:** Mexico, Sonora (Gentry 11601 [US]). – **Lit:** Gentry (1972); Matuda & Piña Lujan (1980); both with ills. **D:** N Mexico (Sonora); grassy slopes in open woodland, on volcanic or limestone rocks, 600 - 1300 m, flowers February to April.

[1b] Stems branched at the base and above, 4 - 6 m tall; **L** ascending to descending, persisting dry and deflected when old and forming a skirt on the trunk, slightly narrowed above the base, smooth, 70 - 100 (-140) × 4 - 5 cm, dark green, margins narrow, brown, terminal **Sp** stout, broadly grooved, (chestnut-) brown; **Inf** erect or deflexed, open, 0.7 - 1 m, scape 10 - 30 cm, part-**Inf** densely white-tomentose, horizontal or slightly ascending; **Ped** short to nearly none; **Fl** erect or divergent, large; **Tep** spreading, ovate, thin, bluntly mucronate, connate at the base, 6 - 9 cm, creamy-white; **Ov** elongate, 4.5 - 6 cm; **Fr** fleshy berries, large.

Y. harrimaniae Trelease (Annual Rep. Missouri Bot. Gard. 13: 59, 1902). **T:** USA, Utah (Trelease s.n. [MO?]). – **Lit:** Reveal (1977); Hochstätter (2000b); both with ills. **D:** SW USA. **I:** Hochstätter (1999a).

Incl. *Yucca coloma* Andrews (1926).

Y. harrimaniae var. **harrimaniae** – **D:** SW USA (E-C Nevada, Utah, W and C Colorado, NE Arizona, N New Mexico); desert slopes and foothills, mostly on limestone, usually 1000 - 2500 m, flowers April to July. **I:** Hochstätter (1998).

Incl. *Yucca harrimaniae* var. *gilbertiana* Trelease (1907) ≡ *Yucca gilbertiana* (Trelease) Rydberg (1918) ≡ *Yucca harrimaniae* ssp. *gilbertiana* (Trelease) Hochstätter (2000); **incl.** *Yucca nana* Hochstätter (1998).

[3d] Acaulescent; **Ros** forming dense to open clumps of 3 - 20 **Ros**, 30 - 80 cm Ø; **L** linear to lanceolate or spatulate-lanceolate, canaliculate, lower face convex, base broad, rigid and stiff, striate, 10 - 50 × 0.7 - 4 cm, rather glaucous, grey- or blue- to deep green, margins at first papery, soon separating into long fine to coarse curly fibres, tip tapering gradually to a short stiff ivory-coloured terminal **Sp**; **Inf** erect, racemose or rarely with few short part-**Inf**, scape 10 - 40 cm, **Fl**-bearing part 35 - 70 cm; **Ped** 1 - 2 cm; **Fl** pendent, broadly campanulate, 4 - 6 (-6.5) cm; **Tep** ovate, fleshy, **ITep** broader than the **OTep**, white to pale green or yellowish to

greenish-yellow, commonly tinged with purple, tube 2 - 4 mm; **Ov** 1.5 - 2 cm; **Fr** dry capsules, cylindrical, (2.2-) 4 - 5 (-6) × 2 - 3 cm, deeply constricted towards the middle, opening mainly above the constriction only; **Se** 5 - 6 mm, dull black.

The recently described *Y. nana* clearly represents a redundant description of a small-growing local variant within this variable taxon.

Y. harrimaniae var. **neomexicana** (Wooton & Standley) Reveal (in Cronquist & al., Intermountain Fl. 6: 530, 1977). **T:** USA, New Mexico (Standley 6208 [US?]). – **Lit:** Reveal (1977); Hochstätter (2000b); both with ills. **D:** SW USA (SE Colorado, adjacent New Mexico).

≡ *Yucca neomexicana* Wooton & Standley (1913) ≡ *Yucca harrimaniae* ssp. *neomexicana* (Wooton & Standley) Hochstätter (1999).

[3d] Differs from var. *harrimaniae*: **L** linear, narrower, only 7 - 20 mm broad; **Tep** pure white.

The recent transfer to subspecies level of this and other taxa by Hochstätter (1999b) is – though it conforms with current trends in other genera and families – not accepted here, since many additional combinations would be necessary to give a comparable treatment of the groups.

Y. harrimaniae var. **sterilis** Neese & S. L. Welsh (Great Basin Naturalist 45(4): 789, 1986). **T:** (Welsh 18461 [BRY]). – **Lit:** Reveal (1977); Hochstätter (2000b); both with ills. **D:** SW USA (NE Utah: Uintah Basin); salt desert scrub communities.

≡ *Yucca harrimaniae* ssp. *sterilis* (Neese & S. L. Welsh) Hochstätter (1999).

[3d] Differs from var. *harrimaniae*: Strongly rhizomatous and **Ros** often widely spaced; **L** flaccid, often reclining on the ground, typically curved, margins sparingly or not filiferous; **Inf** only to 40 cm; **Fr** not known to be formed.

A geographically isolated variety.

Y. jaliscensis Trelease (CUSNH 23(1): 92, 1920). **T** [lecto]: Mexico, Jalisco (Pringle 4392 [US [status?]]). – **Lit:** Matuda & Piña Lujan (1980: with ills.); McVaugh (1989). **D:** Mexico (Jalisco, Guanajuato, Colima); plains with deeper soils or moderate slopes, 1000 - 1600 m, flowers September to May or almost throughout the year.

Incl. *Yucca schottii* var. *jaliscensis* Trelease (1902).

[1c] Arborescent, stems to 12 m, much branched, **Br** often 5 - 8, long and upright; **L** diverging, concave, flexible, (30-) 40 - 100 × (4-) 6 - 7.5 (-8) cm, glaucous-green, margins hardly fibrous, tip sharp-pointed but scarcely differentiated as **Sp**; **Inf** narrowly ellipsoid, 0.5 - 1 m, erect, or drooping at **Fr** time, largely enclosed within the **L**, densely tomentose to canescent with thick blunt **Ha**, scape short; **Fl** subglobose; **Tep** narrowly lanceolate, 22 - 36 × 8 - 16 mm; **Ov** 5 - 7 mm Ø; **Fr** fleshy berries, ellip-

soid, narrowed at the base, asymmetrical, 6 - 12 × 2.5 - 3.8 cm; **Se** rugose, 5 - 7 × 7 - 10 mm.

See Gentry (1972: 161) on the type collection of this species. According to McVaugh (l.c.), it is often cultivated and spreading around settlements, but seldom found in the wild.

Y. lacandonica Gómez-Pompa & Valdés (Bol. Soc. Bot. México 27: 43-44, 1962). **T:** Mexico, Chiapas (*Anonymus* s.n. [not located]). – **Lit:** Matuda & Piña Lujan (1980: with ills.). **D:** Mexico (Veracruz, Tabasco, Campeche, Chiapas); humid tropical evergreen forests, flowers in May.

[1c] Plants strictly epiphytic, stems 2.5 - 3 m, upcurving apically; **L** narrowed at the base (1 cm broad), weak, rigid, to 65 × 6 cm, margins denticulate, 0.5 cm broad, yellowish, tip very acute; **Inf** scape short, ± 40 cm; **Fl** campanulate; **Tep** oblong-linear, 45 × 8 mm; **Fr** fleshy berries, immature **Fr** conical, 4 × 2 cm; **Se** unwinged, 4 - 5 × 2 - 3 mm.

This species is remarkable in being the only strictly epiphytic taxon in the *Agavaceae* (a few species of *Agave* may rarely occur as facultative epiphytes under humid conditions).

Y. linearifolia Clary (Brittonia 47(4): 394-396, ills., 1995). **T:** Mexico, Nuevo León (*Clary* 364 [MEXU, ANSM, MO, TEX, US]). – **D:** Mexico (Coahuila, Nuevo León); desert scrub on shale in shaded canyons, 1100 - 1300 m.

[1/3a] Stems 2 - 3.5 m, mostly single; **Ros** with somewhat flattened top; **L** numerous, linear, distally twisting slightly outwards, persistent when old, reflexing and completely covering the trunk, 34 - 38 × 0.4 - 0.5 (in the middle) cm, greyish-green to glaucous (new growth), margins thin, horny, pale yellow, minutely denticulate, terminal **Sp** 3 - 8 mm, dark reddish-brown to black; **Inf** 60 - 80 cm, erect, scape short, moderately branched, lower (= largest) part-**Inf** with 4 - 6 **Fl**; **Fl** campanulate; **OTep** elliptic, 30 - 33 × 15 mm, **ITep** obovate, 30 × 20 mm, creamy-white, tube none; **Ov** oblong-cylindrical, 9 - 10 mm Ø; **Fr** fleshy berries, indehiscent, asymmetrical, narrowly ovoid, tip constricted, 5 - 7 × 2.3 - 2.5 cm; **Se** polymorphic, dull, black, to 5 - 7 × 4 - 6 mm.

According to the protologue apparently close to the dry-fruited *Y. queretaroensis* and *Y. rostrata* (both Sect. *Chaenocarpa*), but different in its fleshy indehiscent fruits. The species is the only fleshy-fruited *Yucca* with narrow denticulate leaves.

Y. louisianensis Trelease (Annual Rep. Missouri Bot. Gard. 13: 64, 1902). **T:** USA, Arkansas (*Ball* 558 [MO 148578 [lecto?]]). – **Lit:** Hochstätter (1998: with ills.). **D:** USA (C and E Texas, S Arkansas, N to C Louisiana); sandy soils in lax pine- and oak-forests.

≡ *Yucca arkansana* ssp. *louisianensis* (Trelease) Hochstätter (1999); **incl.** *Yucca freemanii* Shinnars

(1951) ≡ *Yucca arkansana* ssp. *freemanii* (Shinnars) Hochstätter (2000).

[3e] Acaulescent; **Ros** single or in small groups; **L** ascending or recurved, grass-like, weak, flexible, 20 - 40 × 2 - 3 cm, bluish-green, margins with curled fibres; **Inf** 1 - 2.5 m, scape 0.5 - 1.5 m, somewhat longer than the **Fl**-bearing part, part-**Inf** ascending; **Fl** campanulate or nearly tubular, 3 - 6 cm, whitish-cream, somewhat tinged with greenish or reddish; **Tep** elliptic to oblong or lanceolate, 25 - 35 × 13 - 15 (-20) mm, margins irregular, tomentose, sometimes roughly dentate; **Ov** oblong to cylindrical, thickly robust; **Fr** dry capsules, oblong-ovoid, sometimes deeply constricted in the middle, 4 - 5 cm, dark brown to black; **Se** black, shiny, 8 - 10 × 4 mm.

This taxon is regarded as a possible synonym of *Y. constricta* by McKelvey (1947), whereas Hochstätter (1998) treats it as a subspecies of *Y. arkansana*.

Y. madrensis Gentry (US Dept. Agric. Handb. 399: 159, ills., 1972). **T:** Mexico, Sonora / Chihuahua (*Gentry* 21209 [US 2557499]). – **Lit:** Matuda & Piña Lujan (1980); Benson & Darrow (1981); both with ills. **D:** S USA (Arizona), N Mexico (Sonora, Chihuahua); on rocky volcanic and limestone slopes in oak woodlands and pine-oak forests, 1200 - 1650 m, flowers in summer. **I:** Hochstätter (1999c: as *Y. schottii*).

[1c] Stems at first simple, eventually surculose, short or to 3 - 5 m, rarely branched; **Ros** deeply leaved in young plants, reduced in old plants; **L** numerous, linear-lanceolate, thin, pliable, mostly straightly ascending to declined on the trunk, rarely recurving, nearly flat to slightly conduplicate, mostly 50 - 80 (-100) × (2-) 3.5 - 5 cm, bluish- (to yellowish-) green, margins thin, brown, friable, exfoliating with age, not or sparsely filiferous, terminal **Sp** weak, 0.5 - 1.5 cm, reddish-brown to grey; **Inf** short, rarely exceeding the **L**, 50 - 80 cm, densely to sparsely tomentose; **Fl** small, globose, ± 3.5 cm, broader than long, basally truncate; **Ov** thick, ± 25 mm incl. the **Sty**; abruptly tapering into the **Sti**; **Tep** ovate or ovate-lanceolate, 2 - 4 × 1 - 2 cm, white, **OTep** brownish, mucronate, tube 7 - 12 mm; **Fr** fleshy berries, rounded at the base, tapering at the tip, frequently irregularly constricted, 60 - 125 × 25 - 38 mm; **Se** thick, rough, 5 - 9 × 7 - 10 mm.

Y. madrensis is characterized by its pliable, light bluish-green leaves, short inflorescences with small flowers, and a summer-flowering habit (Gentry 1972). Lenz & Hanson (2000) recently provided a broader concept for the species as to include the common fleshy-fruited *Yucca* with long flexible blue-green leaves from the mountains of S Arizona, previously named *Y. schottii*. These plants are regarded as conspecific with *Y. madrensis*, which was previously only known from the Sonora / Chihuahua border in M Mexico.

Y. mixtecana García-Mendoza (Acta Bot. Mex. 42: 1-4, ill., 1998). **T:** Mexico, Oaxaca (*García-Mendoza & al.* 6198 [MEXU, BM, ENCB, MO, OAX, TEX]). – **D:** Mexico (S Puebla, NW Oaxaca); xerophytic scrub, 1370 - 2200 m.

[1c] Arborescent, stems 2.5 - 5 m, $\pm$ conical, simple or sparsely branched in the upper part, forming rhizomatous colonies of 10 - 25 individuals; **L** linear-lanceolate or linear, erect, 40 - 65 (-75) $\times$ 1.5 - 3 cm, glaucous to greenish-yellowish, deciduous when dry, margins entire, with a dark border, filiferous with fine and soft threads, terminal **Sp** 0.5 - 1 cm, dark brown, canaliculate; **Inf** 50 - 80 cm, erect, moderately branched, scape 20 - 30 cm, pilose, part-**Inf** 10 - 20 cm, pilose, with 15 - 20 **Fl** each; **Ped** (1-) 1.5 - 2 cm, pilose; **Fl** (1.5-) 2 - 2.5 (-3) cm, campanulate, pendent; **Tep** elliptic, 2 - 2.5 (-3) $\times$ 0.4 - 1 (-1.3) cm, **OTep** broadest, whitish to yellowish; **Ov** cylindrical, 1.5 - 2 (-3) cm; **Fr** fleshy berries, cylindrical, pendent, (3-) 5 - 8 $\times$ 2 - 2.5 cm; **Se** drop-shaped, black.

According to the protologue closest to *Y. periculosa* and *Y. jaliscensis*, from both of which it differs by its shorter, conical, slender, sparsely branched stems, narrower caducous leaves and much smaller flowers and fruits.

Y. necopina Shinnery (Spring Fl. Dallas-Fort Worth Area 408, 1958). **T:** USA, Texas (*Shinnery* 20/102 [TEX?]). – **Lit:** Diggs & al. (1999: with ill.). **D:** USA (N-C Texas); river terraces in sandy soils; flowers May to June.

[3e] Similar to *Y. arkansana*, but stems 1 - 3 m tall; **L** 50 - 80 $\times$ 1.5 - 4 cm, margins white, with curly fibres; **Inf** large, much-branched, well above the **L**, completely glabrous; **Tep** greenish-white; **Ov** 2 $\times$ as long as the **Sty** and **Sti**.

A local endemic known from few populations only. The status of the taxon is disputed: Field and molecular studies support species rank, whereas the forthcoming treatment for the 'Flora of North America' will treat it as a synonym of *Y. arkansana*. The species appears to be closest to *Y. louisianensis*, which is distinguished by its usually narrower leaves and pubescent inflorescences (Diggs & al. 1999).

Y. pallida McKelvey (Yuccas Southwest US 2: 57, 1947). **T:** USA, Texas (*McKelvey* 2862 [A]). – **Lit:** Webber (1953); Diggs & al. (1999: with ill.); Hochstätter (2000b: with ill.). **D:** USA (N-C Texas); limestone outcrops or rocky prairies, 100 - 400 m, flowers April to June.

$\equiv$ *Yucca rupicola* fa. *pallida* (McKelvey) hort. (s.a.) (*nom. inval.*, Art. 29.1); **incl.** *Yucca rupicola* Trelease (1902) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca rupicola* var. *edentata* Trelease (1912) (*incorrect name*, Art. 11.4) $\equiv$ *Yucca pallida* var. *edentata* (Trelease) Cory (1952).

[3a] Acaulescent; **Ros** growing in small to large

rhizomatous colonies of usually 10 - 30 **Ros**, usually distinctly separate from one another; **L** few, thin, flexible, straight when mature, acuminate, flat except for 1.3 - 2.5 cm below the tip, 20 - 35 $\times$ up to 3 cm, blue- to grey-green, margins flat, bright yellow, finely serrate; **Inf** 1 - 3 m; **Fl** campanulate, 5 - 6.5 cm, pendent; **Tep** narrowly to broadly elliptic, ovate, 2 - 3.5 cm, pale green, margins white, somewhat serrate; **Ov** oblong-cylindrical, 3 - 4 cm, pale blue or yellow-green; **Fr** dry capsules, 4 - 6 $\times$ 1.3 - 2.5 cm, yellowish-brown, later dark brown to black; **Se** small, dull, rough, surface sculptured, 4 - 6 $\times$ 2 - 3 mm, black.

Webber (1953) reports difficulties to distinguish *Y. pallida* from *Y. rupicola* and indirectly includes the former as synonym of the latter. However, Kartesz (1996), USDA (2001) and Diggs & al. (1999) as well as Hochstätter (2000b) all keep the species separate from its close relative *Y. rupicola*. It differs from *Y. rupicola* in forming larger clumps of 10 - 30 rosettes with straight flat leaves with flat and bright yellow margins (Diggs & al. l.c.) and flowers with longer tepals, a more stocky ovary, thicker style, as well as the erect and scarcely spreading stigma lobes (Hochstätter l.c.).

Y. periculosa Baker (Gard. Chron. 1870: 1088, 1870). – **Lit:** Matuda & Piña Lujan (1980: with ill.). **D:** Mexico (Veracruz, Tlaxcala, Puebla, Oaxaca); desert scrub, on plains with deeper soil or on moderate slopes, 1300 - 1600 m.

$\equiv$ *Yucca baccata* var. *periculosa* (Baker) Baker (1880); **incl.** *Yucca circinata* Baker (1870) $\equiv$ *Yucca baccata* var. *circinata* (Baker) Baker (1880).

[1c] Arborescent, stems to 15 m, much-branched in age, **Br** ascending; **L** oblong or linear-lanceolate, 35 - 50 $\times$ 2 - 3.5 cm, margins finely fibrous; **Inf** broadly ovoid, erect or somewhat inclined, compact, scape enclosed within the **L**; **Ped** 10 - 15 mm; **Fl** expanded; **Tep** generally pubescent, to 35 $\times$ 10 - 12 mm; **Fr** fleshy berries, pendent, oblong, 5 - 8 $\times$ 2.5 - 3.2 cm.

Y. potosina Rzedowski (Ciencia (Mexico) 55(4-5): 90-91, 1955). – **Lit:** Matuda & Piña Lujan (1980: with ill.). **D:** Mexico (San Luis Potosí); slopes with shallow soil, submontane scrub or oak scrub, $\pm$ 1700 m, flowers June to July.

[1c] Arborescent, stems 2 - 7 m, poorly branched; **L** plane or somewhat canaliculate, 30 - 100 $\times$ 3 - 6 cm, margins dark brown, outer part grey, with thin and curled grey fibres, terminal **Sp** 2 - 3 cm, grey; **Inf** pendent, much extending the **L**, with very dense part-**Inf**; **Ped** subverticillate, 1.5 - 2.5 cm; **Tep** elliptic-oblong to obovate, truncate at the base, tip acute, mainly glabrous, **ITep** apically with pubescent margins, 25 - 50 $\times$ 8 - 20 mm, white; **Ov** 15 - 20 mm; **Fr** fleshy berries, oblong, 4 - 8 $\times$ 2.5 - 3.5 cm; **Se** obovate, 6 - 8 $\times$ 5 - 6 mm.

Y. queretaroensis Piña Lujan (Cact. Suc. Mex. 34(3): 51-56, ill., 1989). **T:** Mexico, Querétaro (*Piña Lujan* s.n. [MEXU 472851, ENCB, IZTA]). – **D:** Mexico (Querétaro); known only from the type locality, 1300 m, flowers April to June.

[3a] Caulescent, stems generally unbranched, 3 - 5 m, forming small rhizomatous colonies of 3 - 10 stems; **L** numerous, linear, rigid, both faces convex, on both faces with a slight keel and 2 furrows between keel and margins, 40 - 50 × 0.3 - 0.5 cm, green, persistent, in age reflexed and covering the stems, margins horny, yellowish, finely denticulate, terminal **Sp** 0.5 - 1.5 cm, coffee-brown; **Inf** ovoid, erect, much-branched, 0.6 - 0.8 m, part-**Inf** to 14 - 16 cm, finely tomentose; **Ped** 1 - 2 cm; **Fl** pendent, campanulate to globose; **Tep** lanceolate to narrowly elliptic, 23 - 26 × 12 mm, whitish-cream, tube none; **Fr** and **Se** unknown.

See l.c. 35(3): 61-62, 1990, for details of the typification. Closest to *Y. thompsoniana* according to the protologue, but different in its higher and unbranched stems, biconvex and more slender leaves and smaller flowers.

Y. recurvifolia Salisbury (Parad. Lond. t. 31 + text, 1806). – **Lit:** Cullen (1986). **D:** SE USA (Louisiana, Mississippi, Alabama, Florida, Georgia); sandy soils in Gulf Coast plains, flowers in autumn.

≡ *Yucca gloriosa* fa. *recurvifolia* (Salisbury) Engelm. (1873); **incl.** *Yucca recurva* Haworth (1819); **incl.** *Yucca angustifolia* Karwinsky ex G. Don (1839) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca flexilis* Carrière (1859); **incl.** *Yucca acuminata* hort. ex Carrière (1859) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca angustifolia* hort. ex Carrière (1859) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca longifolia* hort. ex Carrière (1859) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca stenophylla* hort. ex Carrière (1859) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca boerhaavii* Baker (1870) ≡ *Yucca flexilis* var. *boerhaavii* (Baker) Trelease (1902); **incl.** *Yucca semicylindrica* Baker (1870); **incl.** *Yucca eylesii* Hort. Peacock ex Baker (1880); **incl.** *Yucca falcata* Hort. Peacock ex Baker (1880); **incl.** *Yucca mexicana* hort. ex Baker (1880); **incl.** *Yucca nobilis* Hort. Peacock ex Baker (1880); **incl.** *Yucca peacockii* Baker (1880) ≡ *Yucca flexilis* var. *peacockii* (Baker) Trelease (1902); **incl.** *Yucca laevigata* hort. ex Nicholson (1887).

[1d] Arborescent, stems simple or sometimes branched, to 2.5 m; **L** ensiform, usually recurving in the upper ½, tapering towards the tip, pliable, 50 - 100 × 3.5 - 5 cm, mainly green but glaucous, margins narrowly yellow or brown; **Inf** 1.65 - 2.1 m, scape 0.9 - 1.1 m, narrowly ellipsoid in outline, barely exceeding the **L**; **Fl** to 7.5 cm Ø; **Tep** white or slightly greenish-white; **Fr** berries, erect, indehiscent-leathery, not fleshy, oblong, 6-winged or 6-ribbed, 2.5 - 4.5 cm; **Se** thin, 5 - 8 mm Ø.

Poorly known. Very close to and doubtfully distinct from *Y. gloriosa* (see also there), which needs

further study. Major differences are its more pliable lax leaves, its inflorescence barely exceeding the leaves, its smaller and erect fruits and its autumnal flowering season (vs. mainly stiff erect leaves, inflorescences distinctly held above the leaves, larger and pendent fruits, and a spring-flowering season in *Y. gloriosa*).

Y. reverchonii Trelease (Annual Rep. Missouri Bot. Gard. 22: 102, 1911). **T:** USA, Texas (*Reverchon* s.n. [MO 148679]). – **Lit:** Webber (1953); Reveal (1977); Matuda & Piña Lujan (1980); all with ill. **D:** USA (Texas), Mexico (Coahuila); usually on rocky limestone ledges and gravelly plains in dense bush, 300 - 900 m, flowers May to mid-June.

[3a] Acaulescent, **Ros** single but in age forming small dense clumps 0.3 - 1 m Ø with 1 - 25 **Ros**; **L** few, linear to somewhat broader towards the middle, canaliculate, quite rigid, straight, 25 - 55 × 1 - 2 cm, light glaucous-green, margins hyaline yellow or occasionally red or brown, minutely denticulate; **Inf** narrowly ovoid to narrowly pyramidal, scape slender, 46 - 110 cm, glabrous to heavily floccose, **Fl**-bearing part starting 25 - 42 cm above the **L**, 36 - 100 cm, part-**Inf** and **Fl** few; **Fl** pendent, campanulate to somewhat globose, expanding but little at anthesis; **Tep** ovate, sharply acuminate, 38 - 60 × 15 - 29 mm, white or greenish-white; **Ov** 4 - 6 mm Ø, tapering or rarely abruptly narrowed into the **Sty**; **Fr** dry capsules, ellipsoid, rarely constricted, with attenuate beak, 38 - 59 × 18 - 31 mm; **Se** flat, thin, unwinged, 5 - 6 × 6 - 7 mm, dull black.

This species is similar to *Y. rupicola* in its tall upright inflorescences, but best distinguished by its straight, thinner and longer leaves (vs. twisted in *Y. rupicola*) (Hochstätter 2000b). Its distribution lies between that of *Y. rupicola* and *Y. thompsoniana* (McKelvey 1947), leading to apparent hybridization with both species (Webber 1953).

Y. rigida (Engelmann) Trelease (Annual Rep. Missouri Bot. Gard. 13: 65, 1902). – **Lit:** Matuda & Piña Lujan (1980: with ill.). **D:** Mexico (Chihuahua, Coahuila, Durango); stony ravines and slopes in desert scrub, 1200 - 1500 m. **Fig. X.b**

≡ *Yucca rupicola* var. *rigida* Engelman (1873).

[3a] Stems to 4.5 m, **Br** none or few; **L** linear, slightly broadened in the middle, slightly canaliculate, thin, 42 - 61 × 1.2 - 1.7 cm, yellowish-green, glaucous, tip very pungent; **Inf** ellipsoid to ovoid, scape 30 - 70 cm, slightly pubescent, **Fl**-bearing part to 1 m, dense, part-**Inf** 28 - 40; **Fl** globose to campanulate; **Tep** narrowly oblong, acuminate, 42 - 50 × 11 - 20 mm; **Ov** 2 - 6 mm Ø; **Fr** dry capsules, strongly beaked, 35 - 70 × 18 - 25 mm; **Se** 4 × 6 - 7 mm.

Y. rostrata Engelman ex Trelease (Annual Rep. Missouri Bot. Gard. 13: 58, 1902). **T:** Mexico, Co-

ahuila (*Palmer* s.n. [MO 148694]). – **Lit:** Matuda & Piña Lujan (1980); Hochstätter (2000b); both with ill. **D:** USA (Texas), Mexico (Chihuahua, Coahuila); mountain slopes, canyon bottoms, plains and moderate slopes with desert scrub, 300 - 800 m, flowers March to May.

[3a] Arborescent, stems 1.8 - 3.2 (-4.5) m, erect, simple or with few **Br**; **Ros** frequently asymmetrical, rather small; **L** linear, broadest above the middle, flat to canaliculate, smooth on both faces, often twisted, 25 - 60 × 1.2 - 1.7 cm, glaucous, margins yellow, finely denticulate, terminal **Sp** very pungent; **Inf** sparsely pubescent, 0.6 - 2 m, ellipsoid to ovoid in outline, densely many-flowered, scape 0.3 - 1 m, part-**Inf** 28 - 40, to 38 cm; **Fl** globose to campanulate; **Tep** narrowly ovate, sharply acuminate, 42 - 52 × 11 - 20 mm, white; **Ov** 2 - 6 mm Ø; **Fr** ovoid to ellipsoid, rarely constricted, tip with a strong and curved beak, 3.5 - 7 × 1.8 - 2.5 cm.

Closely related to *Y. thompsoniana*, which may represent a N dwarfer variant (Webber 1953). It is best distinguished by its ± larger habit with larger inflorescences and longer and broader leaves with the widest part considerably above the middle, and smooth on both faces (vs. smaller-growing with smaller inflorescences and shorter and narrower leaves widest at or above the middle and ± scabrous on both faces in *Y. thompsoniana*).

Y. rupicola Scheele (Linnaea 23: 143, 1850). **T** [neo]: USA, Texas (*Hochstätter* 1179.91 [SRP]). – **Lit:** Reveal (1977); Matuda & Piña Lujan (1980); Hochstätter (2000b); all with ill. **D:** USA (Texas), probably adjacent Mexico; limestone ledges and grassy plains, dense bush and open woodland, 450 - 880 m.

Incl. *Yucca lutescens* Carrière (1858); **incl.** *Yucca tortilis* hort. ex Carrière (1858); **incl.** *Yucca rupicola* var. *tortifolia* Engelman (1873); **incl.** *Yucca tortifolia* Lindheimer ex Engelm (1873) (*nom. inval.*, Art. 32.1).

[3a] Acaulescent, soon developing open clumps with 6 - 15 large **Ros**; **L** few, very broad towards the middle, concave or flat but oblique or undulate or twisted, slightly striate, flaccid, 30 - 58 × 2 - 4 cm, dark green, margins hyaline reddish-brown or occasionally yellow, minutely denticulate, tip pungent; **Inf** narrowly ovoid to narrowly pyramidal, scape slender, 36 - 152 cm, glabrous to slightly floccose, **Fl**-bearing part starting 24 - 48 cm above the **L**, 31 - 100 cm, part-**Inf** 8 - 16, 1 - 13 cm; **Fl** few, pendent, mainly campanulate, expanding but little, rarely somewhat globose and open; **Tep** ovate, sharply acuminate, 3.8 - 6.9 × 1.5 - 3 cm, white or greenish-white; **Ov** tapering or somewhat abruptly terminating into the **Sty**, 4 - 6 mm Ø; **Fr** dry capsules, ellipsoid or somewhat cylindrical, beaked, rarely constricted, 3.8 - 5.4 × 2 - 3 cm; **Se** 6 - 8 × 7 - 8 mm.

The species is best characterized by its clearly

twisted concave leaves (Hochstätter 2000b). For differences from *Y. pallida* see there. Since the original type material collected by Lindheimer is lost, Hochstätter (l.c.) selected a neotype.

Y. schidigera Roetzl ex Ortgies (Gartenflora 20: 110, 1871). **T:** USA, California (*Nuttall* s.n. [GH]). – **Lit:** Matuda & Piña Lujan (1980); Turner & al. (1995); both with ill. **D:** S USA (California, Nevada, Arizona), probably adjacent Mexico; gravelly mountain and valley slopes, desert or chaparral vegetation, 300 - 1800 m, flowers April to mid-May. **I:** Hochstätter (1999a). **Fig. X.c**

Incl. *Yucca californica* Nuttall ex Baker (1880) (*nom. inval.*, Art. 34.1c); **incl.** *Yucca mohavensis* Sargent (1896).

[1c] Plants commonly fruticose, or clumped, clumps rather tall, broad and open, stems (1-) 4 - 7 (-23), erect or somewhat assurgent, rarely to 2.5 m; **L** numerous, broadest near the middle, greater part rather deeply canaliculate, thick, very rigid, 33 - 105 × 2.5 - 5 cm, yellow-green, margins thick, with coarse somewhat curled fibres; **Inf** ellipsoid or with flattened tip, scape 0 - 15 cm, **Fl**-bearing part entirely within the **L** or to ½ of its length above the **L**, 0.5 - 1.25 m, part-**Inf** many; **Fl** many, dense, globose; **Tep** (broadly) lanceolate, 24 - 45 × 6 - 10 mm, white or cream-coloured, commonly tinged with lavender or purple; **Ov** rather stout, 5 - 8 mm Ø; **Fr** fleshy berries, variable, long and cylindrical, mostly constricted in the middle, 9 - 11.5 × 3 - 3.8 cm, usually tapering from the swollen base to a rather blunt tip 6 - 8.5 cm long; **Se** unwinged, 6 - 9 × 8 - 11 mm, dull black.

Y. xschottii Engelm pro sp. (Trans. Acad. Sci. St. Louis 3: 46, 1873). **T** [lecto]: USA, Arizona (*Schott* s.n. [NY]). – **Lit:** Webber (1953); Gentry (1972: with ill.); Turner & al. (1995: with ill. as *Y. arizonica*). **D:** S USA (Arizona, SW New Mexico?), N Mexico (Sonora, Chihuahua); rocky slopes (volcanic and limestone) in oak woodland and pine-oak forests, (350-?) 1200 - 1500 m. **I:** Hochstätter (1999a). **Fig. X.g** ('*Y. thornberi*')

Incl. *Yucca puberula* Torrey (1858) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca brevifolia* Schott ex Torrey (1859) (*nom. inval.*, Art. 34.1c); **incl.** *Yucca brevifolia* Schott ex Engelm (1873) (*nom. inval.*, Art. 32.1); **incl.** *Yucca macrocarpa* Engelm (1881); **incl.** *Yucca treleasei* Macbride (1918) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca arizonica* McKelvey (1935); **incl.** *Yucca thornberi* McKelvey (1935); **incl.** *Yucca confinis* McKelvey (1938); **incl.** *Yucca baccata* var. *brevifolia* Benson & Darrow (1943).

Lenz & Hanson (2000) recently clarified the nomenclatural and taxonomic confusion surrounding *Y. schottii*. According to their interpretation, the name *Y. schottii* Engelm represents the earliest applicable name for hybrids between *Y. baccata*, *Y. elata* and *Y. madrensis*, and it is thus recognized as

name for a collective hybrid species. The common fleshy-fruited *Yucca* with long flexible blue-green leaves from the mountains of S Arizona, previously wrongly named *Y. schottii*, is regarded as pertaining to *Y. madrensis*.

Y. tenuistyla Trelease (Annual Rep. Missouri Bot. Gard. 13: 53, t. 17-19, 1902). **T:** USA, Texas (*Lindheimer* s.n. [MO]). – **D:** USA (Texas); scrubland at the coast, spring-flowering.

[3c] Acaulescent; **L** mostly recurving, lanceolate, soft, 40 - 70 × 1 - 2 cm, margins whitish, tip scarcely pungent; **Inf** not described; **Tep** narrowly acute, white (?); **Ov** white; **Sty** oblong, white or green, often deeply divided; **Fr** dry capsules, stout, cylindrical, symmetrical, 5 - 6.5 × 2.5 - 3 cm; **Se** glossy, 8 - 10 × 7 - 8 mm.

This taxon (as well as *Y. louisianensis*) is regarded as a possible synonym of *Y. constricta* by McKelvey (1947), from which both differ only tenuously.

Y. thompsoniana Trelease (Annual Rep. Missouri Bot. Gard. 22: 101, t. 104-107, 1911). **T:** Mexico, Chihuahua (*Bigelow* s.n. [MO 148777]). – **Lit:** Matuda & Piña Lujan (1980); Hochstätter (2000b); both with ill. **D:** USA (Texas), Mexico (Chihuahua, Coahuila, Nuevo León), usually on exposed rocky knolls and slopes, 275 - 1350 m, flowers April to May.

Incl. *Yucca rostrata* var. *linearis* Trelease (1907) ≡ *Yucca linearis* (Trelease) D. J. Ferguson (1996); **incl.** *Yucca rostrata* fa. *integra* Trelease (1911).

[3a] Arborescent, stems 1 - 3, 0.7 - 2.6 m, erect with comparatively long ascending or diffusive **Br**; **Ros** frequently asymmetrical, rather small; **L** few, linear or somewhat broader towards the middle, flat or canaliculate to flat above and keeled below, striate, thin and flexible, 18 - 30 × 0.7 - 1.2 cm, margins horny, yellow or brownish, minutely denticulate; **Inf** narrowly ellipsoid to somewhat ovoid, scape 38 - 68 cm, glabrous or evanescently pubescent, **Fl**-bearing part starting 11 - 19 cm above the **L**, 52 - 82 cm, part-**Inf** 20 - 34, 2 - 22 cm; **Fl** globose to campanulate, broadly spreading at anthesis; **Tep** narrowly oblong, sharply acuminate, conspicuously veined, 35 - 67 × 12 - 35 mm, white; **Ov** slender, usually tapering into the **Sty**, 4 - 6 mm Ø; **Fr** dry capsules, ellipsoid or somewhat ovoid, rarely constricted, 3.5 - 7 × 2 - 2.5 cm, with a long beak; **Se** flat, thin, unwinged, 5 - 6 × 6 - 7 mm, dull black.

Closely related to *Y. rostrata* (see there for differences).

Y. torreyi Shafer (in Britton & Shafer, North Amer. Trees, 157, fig. 117, 1908). **T:** USA, Texas (*Bigelow* s.n. [not extant]). – **Lit:** Reveal (1977); Matuda & Piña Lujan (1980); Benson & Darrow (1981); all with ill. **D:** SE USA (Texas), Mexico (Chihuahua, Coahuila, Nuevo León, Tamaulipas,

Durango); plains with deeper soil and flat slopes in desert scrub, 450 - 1500 m. **I:** Hochstätter (1999a).

Incl. *Yucca baccata* var. *macrocarpa* Torrey (1859) ≡ *Yucca macrocarpa* (Torrey) Merriam (1893) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca crassifolia* Engelm. (1873) (*nom. inval.*, Art. 32.1); **incl.** *Yucca torreyi* fa. *parviflora* McKelvey (1938).

[1c] Stems forming groups of variable height, to 4.5 m, simple or sparsely branched; **L** rigid, canaliculate, sometimes plane, scabrous on both faces, 30 - 103 × 3 - 5 cm, yellowish-green, margins thick, with thick straight fibres, terminal **Sp** short; **Inf** with a scape 0 - 10 cm long, ellipsoid, tip truncate, exceeding the **L** for ¼ - ½ of its length, 36 - 70 cm, densely many-flowered; **Fl** subglobose to campanulate; **Tep** very variable in shape and size; **OTep** 34 - 75 × 8 - 18 mm, cream-coloured with dark purple markings towards the base; **Ov** 4 - 8 mm Ø; **Fr** fleshy berries, cylindrical and ovoid, narrowed towards the tip, 7 - 11.2 × 2.5 - 3.8 cm; **Se** 5 - 8 × 6 - 9 mm.

Y. treculiana Carrière (Rev. Hort. 1858: 580, 1858). **T:** USA / Mexico (*Trécul* 1496 [P]). – **Lit:** Webber (1953); Matuda & Piña Lujan (1980: with ill.). **D:** SE USA (S-C Texas), N Mexico (Coahuila, Nuevo León, Tamaulipas, Durango); plains with deeper soils in desert scrub, 100 - 1600 m, flowers March to April. **I:** Hochstätter (1999a).

Incl. *Yucca treculiana* var. *treculiana*; **incl.** *Yucca agavoides* hort. ex Carrière (1858); **incl.** *Yucca aspera* Regel (1858); **incl.** *Yucca recurvata* hort. ex Carrière (1858); **incl.** *Yucca revoluta* hort. ex Carrière (1858); **incl.** *Yucca undulata* hort. ex Carrière (1858); **incl.** *Yucca canaliculata* Hooker (1860) ≡ *Yucca treculiana* var. *canaliculata* (Hooker) Trelease (1902); **incl.** *Yucca longiflora* Buckley (1863); **incl.** *Yucca argospatha* Verlot (1868); **incl.** *Yucca longifolia* Engelm. (1873) (*nom. inval.*, Art. 32.1); **incl.** *Yucca cornuta* hort. ex Baker (1880); **incl.** *Yucca concava* hort. ex Baker (1880) (*nom. illeg.*, Art. 53.1); **incl.** *Yucca treculiana* var. *succulenta* McKelvey (1938).

[1c] Stems forming groups of variable height, simple or sparsely branched; **L** rigid, concave, conduplicate, rather scabrous, 50 - 100 × 2.5 - 5 cm, yellowish-green, margins entire or with sparse thin and straight fibres, terminal **Sp** very acute; **Inf** with a scape to 30 cm, ellipsoid, exceeding the **L** for ½ - ¾ of its length, densely many-flowered; **Bra** large in the lower **Inf** parts; **Fl** globose to semiglobose; **OTep** 29 - 45 × 11 - 21 mm, white or with rose tinge; **Ov** 4 - 6 mm Ø; **Fr** fleshy berries, cylindrical, terminal part conical, 6.5 - 10 × 1.7 - 2.4 cm; **Se** rough, 4 - 5 × 5 - 6 mm.

Similar to *Y. torreyi*, but distinguishable by its smaller and semiglobose flowers with stout ovaries and by its more symmetrical rosettes with relatively broader, shorter and predominantly non-filiferous leaves (Webber 1953).

The name is usually written 'treculeana', but the taxon is named for the French botanist A. A. L. Trécul.

Y. valida Brandege (Proc. Calif. Acad. Sci., ser. 2, 2: 208, t. 11., 1889). – **Lit:** Matuda & Piña Lujan (1980: with ills.); Turner & al. (1995). **D:** Mexico (Baja California, Baja California Sur); Pacific coastal plains and gentle slopes, to 800 m.

[1c] Arborescent and stems 3 - 12 m tall, or shrub-forming and branched nearly from the base, surculose; **L** many, oblanceolate, thin, 15 - 35 × 1.5 - 3 cm, green-yellowish, old dead **L** forming a skirt around the stem, margins with thick curved fibres; **Inf** short, to 30 cm, hidden between the **L** for $\frac{1}{4}$ - $\frac{1}{2}$, slightly pubescent; **Ped** ± 2.5 - 3 cm; **Fl** campanulate, scented; **Tep** narrowly lanceolate, 2.5 - 3 cm; **Fil** pubescent, 10 - 12 mm; **Ov** oblong, tip abruptly conical; **Sti** sessile; **Fr** fleshy berries, oblong, 2.5 - 4.5 cm, nearly black; **Se** 7 × 1.5 mm, with rugose margin.

An important and characteristic constituent of the fog-influenced Pacific coastal desert scrub formations of the Baja California Peninsula. Plants from the Cape region hitherto included here were recently described as a distinct separate species, *Y. capensis* Lenz.

Aloaceae

Small herbaceous shrubby or pachycaul arborescent **L**-succulent perennials, rarely with a bulbous base; **R** fibrous, usually terete, sometimes tuberously thickened or fusiform; stem stout or slender, simple or branched, erect, decumbent or pendulous, short to several m tall, sometimes so short that the plants are described as acaulescent; **L** simple, alternate, amplexicaul, linear, deltoid, falcate, lanceolate or triangular, crowded in dense **Ros** at tips of stems and **Br** or at ground-level, sometimes widely spaced along stem, persistent for several years, usually distinctly succulent and mottled with whitish spots or striations, often prickly along the margins and sometimes on both sides, tip usually ending in a weak to fairly strong **Sp**, surfaces smooth or rough; **L** tissue usually with coloured exudate when broken; **Inf** racemes, panicles or rarely spikes, axillary, bracteate, peduncle scape-like, massive or slender; **Fl** hermaphroditic, 3-merous throughout, red, orange, yellow or white, rarely green; **Tep** in 2 whorls of 3, petaloid and often fleshy, connivent or connate into a straight or curved sometimes ventricose tube, limb ± regular or sometimes bilabiate; **St** 6, free, **Anth** with 2 thecae, opening by longitudinal slits, included or exserted; **Ov** compound, 3-locular, superior, placentation axile, sometimes with septal **Nec**, each locule with numerous ovules; **Sty** terminal, with punctate or discoid **Sti**; **Fr** loculicidal capsules, rarely fleshy and dehiscent berries; **Se** usually flattened or winged. – *Cytology*: $x = 7$, with a distinctive basic karyotype of 4 long and 3 short chromosomes. Most species are diploid, but some polyploidy and aneuploidy occur, esp. in *Aloe* and *Haworthia*, as summarized by Riley & Majumdar (1979).

Distribution: Africa, Arabian Peninsula, Socotra, Mascarene Islands, Madagascar.

Literature: Berger (1908); Riley & Majumdar (1979).

The family *Aloaceae* was for long regarded as tribe *Aloeae* (often erroneously as "Aloineae") of the family *Liliaceae*. It is now treated as a distinct family (Cronquist 1981), as here, or as subfamily *Alooideae* in the *Asphodelaceae*, as advocated by Dahlgren & al. (1985) or Smith & Wyk (1991). It differs from *Asphodelaceae*, though not entirely consistently, by having succulent leaves, tubular flowers, a basic bimodal complement of 4 long and 3 short chromosomes, and the presence of a parenchymatous cap at the phloem pole.

Aloaceae numbers ± 500 species in 6 genera, of which 5 are restricted to southern Africa. Numerous taxa of *Aloe*, *Gasteria* and *Haworthia* are much cultivated by succulent plant enthusiasts, and *Aloe* species are also often planted as conspicuous garden

plants in warmer climates. Apart from limited medicinal and other traditional uses of several taxa of *Haworthia* and *Gasteria*, *Aloe vera* and *A. ferox* are widely used medicinally as purgatives, as ingredients in cosmetic products, and to treat skin irritations and burns, and the industries based on these 2 taxa are worth millions of dollars per year alone in RSA.

Numerous bigeneric and some trigeneric hybrids have been created and formally named. In addition to the hybrid genera covered here, the illegitimate name $\times$ Rowleyara D. M. Cumming 1999 refers to the combination *Astroloba* $\times$ *Gasteria* $\times$ *Haworthia*.

Key to the genera:

- 1 **Fr** apically acuminate capsules; underground plant parts bulbous; **Fl** usually < 15 mm long: **Chortolirion**
 - **Fr** apically rounded or obtuse capsules, or berries; underground plant parts rhizomatous (if rarely bulbous then **Fl** > 15 mm long): **2**
- 2 **Tep** orange, apically connivent and $\pm$ greenish: **Poellnitzia**
 - **Tep** of various colours incl. orange, apically spreading or recurved: **3**
- 3 **Fl** pendulous at anthesis, **Per** tube curved upwards, often basally inflated: **Gasteria**
 - **Fl** erect, suberect, spreading or pendent at anthesis, **Per** tube straight or curved downwards: **4**
- 4 **Per** bilabiate, < 15 mm long, mouth not upturned, colours clear to dirty white, greenish or yellowish: **Haworthia**
 - **Per** regular (if rarely weakly bilabiate then **Fl** > 15 mm long), mouth upturned, colours various, usually bright: **5**
- 5 **Fl** usually brightly coloured, fleshy; **St** as long as or longer than the **Per**: **Aloe**
 - **Fl** white or dull-coloured, flimsy; **St** included: **Astroloba**

[G. F. Smith & L. E. Newton]

$\times$ ALGASTOLOBA

U. Eggli

$\times$ **Algastoloba** D. M. Cumming (Haworthiad 13(1): 20, 1999). – **Lit**: Cumming (1999). **Etym**: Hybrid formula that combines the names of the involved genera *Aloe*, *Gasteria* and *Astroloba*.

= *Aloe* $\times$ *Astroloba* $\times$ *Gasteria*. The 2 known combinations have not been formally named.

ALOE

L. E. Newton

Aloe Linné (Spec. Pl. [ed. 1], 1: 319, 1753). **T**: *Aloe disticha* Linné [Typification according to P. V. Heath, Calyx 2(4): 142, 1992.]. – **Lit**: Reynolds

(1950); Reynolds (1958); Reynolds (1966); Wood (1983); Carter (1994); Lavranos (1995); Wyk & Smith (1996); Gilbert & Sebsebe (1997); Sebsebe & Gilbert (1997); Rowley (1997); Glen & Hardy (2000). **D**: Africa, esp. S and E; Madagascar, Mascarene Islands, SW Arabia; mainly drier areas, a few in dry forests. **Etym**: From the Greek ('aloe'), Arabian ('alloch') and Hebrew ('ahalim') names for the plants.

Incl. *Kumara* Medikus (1786). **T**: *Kumara disticha* Medikus.

Incl. *Lomatophyllum* Willdenow (1811). **T**: *Lomatophyllum borbonicum* Willdenow [= *Aloe purpurea* Lamarck].

Incl. *Rhipidodendrum* Sprengel (1811). **T**: not typified.

Incl. *Phylloma* Ker Gawler (1813). **T**: *Phylloma aloiflorum* Ker Gawler.

Incl. *Rhipidodendron* Willdenow (1817) (*nom. inval.*, Art. 61.1). **T**: not typified.

Incl. *Pachidendron* Haworth (1821). **T**: not typified.

Incl. *Bowiea* Haworth (1827). **T**: *Aloe bowiea* Schultes & Schultes fil. [Lectotype selected by G. F. Smith, South Afr. J. Bot. 56(3): 303-308, 1990].

Incl. *Pachydendron* Dumortier (1829) (*nom. inval.*, Art. 61.1). **T**: not typified.

Incl. *Agriodendron* Endlicher (1836). **T**: *Aloe ferox* Miller.

Incl. *Succosaria* Rafinesque (1840). **T**: *Aloe spicata* Linné fil.

Incl. *Ariodendron* Meisner (1842). **T**: *Aloe ferox* Miller.

Incl. *Busipho* Salisbury (1866). **T**: not typified.

Incl. *Ptyas* Salisbury (1866). **T**: *Kumara disticha* Medikus.

Incl. *Chamaealoe* A. Berger (1905). **T**: *Bowiea africana* Haworth 1824.

Incl. $\times$ *Lomataloe* Guillaumin (1931).

Incl. *Leptaloe* Stapf (1933). **T**: *Leptaloe albida* Stapf [E. Phillips, Gen. South Afr. Pl., ed. 2, 186, 1951, fide ING.].

Incl. *Guillauminia* Bertrand (1956). **T**: *Aloe albi-flora* Guillaumin.

Incl. *Lemeea* P. V. Heath (1993). **T**: *Aloe haworthioides* Baker.

Perennial **L** succulents; acaulescent, shrubby, or arborescent; simple or branching; **L** rosulate, distichous or scattered along the stem, usually $\pm$ triangular, lanceolate or falcate, sometimes linear, amplexicaul, the margins usually armed with soft or pungent deltoid teeth, the teeth usually more crowded near the **L** base, glabrous, sometimes with short prickles on the surface, uniformly coloured or with whitish or pale green spots, surface smooth or rough, usually with a bitter-tasting yellow or brown exudate when broken, rarely containing fibres; **Inf** lateral, usually $\pm$ erect, simple or branching, with cylindrical or capitate racemes, sometimes with **Fl**

second; **Fl** bracteate, pedicellate, **Ped** often lengthening in **Fr**, rarely **Fl** sessile; **Fl** base rounded, truncate or attenuate, zygomorphic, cylindrical at the base, usually becoming trigonous and slightly compressed laterally above, usually curved, proterandrous, usually red or yellow, rarely white, usually glabrous, rarely puberulent, usually erect in bud and pendulous at anthesis; **OTep** 3, usually marginally fused at base, tips free; **ITep** 3, usually with margins free but dorsally adnate to outer **Per** tube, tips free; **St** 6, usually with **Anth** exerted partly or just clear of **Per** (1 - 6 mm), each group of 3 elongating and exerted, and then retracted in turn during anthesis; **Sty** simple with small capitate **Sti**; **Fr** usually capsules, sometimes berries; **Se** angular or flattened, black or brown, usually with narrow membranous wings. – *Cytology*: The majority of the species investigated are diploid, with a somatic number of $2n = 14$. One hexaploid and several tetraploids are also known. Known chromosome counts are summarized by Riley & Majumdar (1979).

The monotypic genus *Guillauminia* was proposed for *Aloe albiflora*, but this was not recognized by Reynolds (1966). Heath (1994) later recognized *Guillauminia* and added 5 other species, but without any explanatory text to justify his action. In the same paper Heath added 2 more species to his genus *Lemeea*, proposed in 1993 for *Aloe* Sect. *Aloinella* A. Berger, again without explanatory text.

Some intergeneric hybrids are known, esp. between *Aloe* and *Gasteria* (= *xGasteraloe*). Many early intergeneric hybrids were documented by Rowley (1982). Interspecific hybrids have occurred spontaneously in the wild, and many were recorded by Reynolds (1950, 1966) and Newton (1998a). There has also been some artificial hybridization with the aim of producing worthwhile cultivars, the greatest number of named ones being in southern Africa (described in *Aloe*, Journal of the South African Succulent Society, between 1971 and 1978), and in the USA (Riley 1993), with a few in England (Brandham 1973). The following names refer to such intrageneric hybrids: *A. xandrea*, *A. xantoninii*, *A. xborziana*, *A. xcyanea*, *A. xdeltaetii*, *A. xdeleuilii*, *A. xdesmetiana*, *A. xgigantea*, *A. xgrusonii*, *A. xhertrichii*, *A. xhoyeri*, *A. xinsignis*, *A. xjacobseniana*, *A. xlaetecoccinea*, *A. xluteobrunnea*, *A. xpallancae*, *A. xpanormitana*, *A. xpaxii*, *A. xprincipis*, *A. xpseudopicta*, *A. xriccobonii*, *A. xrobertii*, *A. xschimperii*, *A. xschoenlandii*, *A. xspeciosa*, *A. xspinosissima*, *A. xtodari*, *A. xtomlinsonii*, *A. xvarvarii*, *A. xweingartii* and *A. xwinteri*.

In the descriptions below, width of leaf or bract is width at the widest point, at or near the base; details of marginal teeth refer to the middle of the leaf; and diameter of flowers is as seen from the side. Character states that are common to the majority of taxa are not stated, only the exceptions being given. For example, unless otherwise stated, leaves

are erect or slightly spreading, flat or slightly canaliculate above and convex below, inflorescences are erect, floral bracts are scarious, whitish with darker veins, flowers are glabrous, with cylindrical base and laterally compressed with trigonous shape above, anthers are exerted from the perianth by 2 - 6 mm, and fruits are capsules.

No satisfactory infrageneric classification has been proposed since that of Berger (1908), since which time numerous new species have been described. The diversity of character combinations in the genus has, so far, obscured the phylogenetic relationships. For species of southern Africa Reynolds (1950) enlarged Berger's scheme somewhat, but when dealing with tropical species, he (Reynolds 1966) created new groups without formal names or ranks, some of them clearly artificial. The development of a new infrageneric classification for the genus is a long way off and so for the present a completely artificial synopsis is presented below, based on growth habit and inflorescence form. Some very variable species appear in more than one group:

A. Plants acaulescent or with stems shorter than the $\emptyset$ of the **Ros**; **L** broad (> 2 cm) unless otherwise stated:

- [1] Plants with linear or very narrow **L** (usually < 2 cm wide), solitary or forming groups.
- [2] Plants always solitary; **Inf** usually unbranched or with 1 **Br**.
- [3] Plants always solitary; **Inf** usually with 2 or more **Br**.
- [4] Plants solitary or forming small groups; **Inf** usually unbranched or with 1 **Br**.
- [5] Plants solitary or forming small groups; **Inf** usually with 2 or more **Br**.
- [6] Plants suckering to form groups; **Inf** unbranched or with 1 **Br**.
- [7] Plants suckering to form groups; **Inf** with 2 or more **Br**.

B. Plants with obvious stems; **L** broad (> 2 cm) unless otherwise stated:

- [8] **Ros** on unbranched stems to 2 m tall.
- [9] Trees with usually unbranched trunks to > 2 m tall; in some taxa suckering or branching at base to produce 2 or more trunks.
- [10] Plants with linear or very narrow **L**, solitary or branching, sometimes pendulous.
- [11] Plants forming low clumps, often dense.
- [12] Plants forming large clumps (at least 1 m tall).
- [13] Plants with decumbent, sprawling or pendulous stems.
- [14] Plants with stems scrambling in or supported by surrounding vegetation.
- [15] Plants forming shrubs to 1 m tall.
- [16] Plants forming shrubs > 1 m tall.
- [17] Trees with basal trunks and branching above.

C. [18] Plants of unknown or uncertain growth habit.

The following provisional name is to be validated when the plant is better known: *A. vulcanica* Lavranos & Collenette *nom. nud.* (2000).

The following names are of unresolved application but are referred to this genus: *Aloe abyssinica* Lamarck (1783); *Aloe agavefolia* Todaro (1875); *Aloe albispina* Haworth (1804) $\equiv$ *Aloe mitriformis* var. *albispina* (Haworth) A. Berger (1908); *Aloe arabica* Salm-Dyck (1817) (*nom. illeg.*, Art. 53.1); *Aloe arborea* Forsskål (1775); *Aloe arborescens* var. *viridifolia* A. Berger (1908); *Aloe baumii* Engler & Gilg (1903); *Aloe brownii* Baker (1889); *Aloe chloroleuca* Baker (1877); *Aloe cinnabarina* Diels & A. Berger (1905); *Aloe commelinii* Willdenow (1811) $\equiv$ *Aloe mitriformis* var. *comelinii* (Willdenow) Baker (1880); *Aloe commutata* Todaro (1876); *Aloe commutata* var. *tricolor* (Baker) A. Berger (1908); *Aloe congolensis* De Wildeman & T. Durand (1899); *Aloe consobrina* Salm-Dyck (1863); *Aloe constricta* Baker (1880); *Aloe decaryi* Guillaumin (1941); *Aloe defalcata* Chiovenda (1932); *Aloe deflexidens* Pillans (1935); *Aloe dorsalis* Haworth (1821); *Aloe drepanophylla* Baker (1875); *Aloe elizae* A. Berger (1911); *Aloe flavispina* Haworth (1804) $\equiv$ *Aloe mitriformis* var. *flavispina* (Haworth) Baker (1880); *Aloe gasterioides* Baker (1880); *Aloe grahamii* Schönland (1903); *Aloe heteracantha* Baker (1880); *Aloe hexapetala* Salm-Dyck (1817); *Aloe humilis* var. *macilentata* Baker (1880); *Aloe leucantha* A. Berger (1905); *Aloe longiflora* Baker (1888); *Aloe macracantha* Baker (1880); *Aloe mitis* A. Berger (1908); *Aloe mitriformis* var. *humilior* Willdenow (1811); *Aloe mitriformis* var. *pachyphylla* Baker (1880); *Aloe mitriformis* var. *spinosior* Haworth (1804); *Aloe monteiroi* Baker (1889); *Aloe nobilis* Haworth (1812); *Aloe nobilis* Baker (1880) (*nom. illeg.*, Art. 53.1); *Aloe nobilis* var. *densifolia* Baker (1880); *Aloe obscura* Miller (1768); *Aloe obscura* A. Berger ex Schönland (1905) (*nom. illeg.*, Art. 53.1); *Aloe pallescens* Haworth (1821); *Aloe perfoliata* Linné (1753); *Aloe perfoliata* var. *obscura* Aiton (1789); *Aloe perfoliata* var. *serrulata* Aiton (1789) $\equiv$ *Aloe serrulata* (Aiton) Haworth (1804); *Aloe picta* Thunberg (1785); *Aloe picta* var. *major* Willdenow (1799); *Aloe platylepsis* Baker (1877); *Aloe pungens* A. Berger (1908); *Aloe rossii* Todaro (1894); *Aloe rubescens* De Candolle (1799); *Aloe runcinata* A. Berger (1908); *Aloe salmdyckiana* var. *fulgens* (Todaro) A. Berger (1908); *Aloe saponaria* var. *obscura* Haworth (1804); *Aloe sigmoidea* Baker (1880); *Aloe sororia* A. Berger (1908); *Aloe spinulosa* Salm-Dyck (1822) $\equiv$ *Aloe mitriformis* var. *spinulosa* (Salm-Dyck) Baker (1880); *Aloe spuria* A. Berger (1908); *Aloe stans* A. Berger (1908); *Aloe straussii* A. Berger (1912); *Aloe ucrae* A. Terraciano (1897) $\equiv$ *Aloe arborescens* var. *ucrae* (A. Terraciano) A. Berger (1908); *Aloe venenosa* Engler (1893); *Aloe virens* Haworth (1804); *Aloe xanthacantha* Willde-

now (1811) $\equiv$ *Aloe mitriformis* var. *xanthacantha* (Willdenow) Baker (1880).

A. aageodonta L. E. Newton (CSJA 65(3): 138-140, ills., 1993). **T:** Kenya, Eastern Prov. (*Newton* 3643 [K, EA]). – **D:** Kenya; rocky hills, 960 - 1250 m. **Fig. X.h**

[13] Caulescent, branching at the base; stem erect for 1 m, then becoming decumbent and sprawling to 2 m, 3 cm $\varnothing$; **L** 12 - 20, laxly rosulate and persistent for 20 - 30 cm below, triangular, 50 $\times$ 8 cm, dull green, spotted on young shoots, surface smooth; marginal teeth 4 mm, pungent, uncinatate, tips brown; exudate yellow, drying brown; **Inf** 70 cm, erect, with 6 - 10 **Br**; racemes with 20 - 40 secund **Fl**, lax at base but most **Fl** crowded near tip; **Bra** 4 - 6 mm; **Ped** 10 - 13 mm; **Fl** yellow or dark red, 30 mm, base attenuate, 7 - 8 mm $\varnothing$ across **Ov**, narrowed to 5 - 6 mm above, scarcely widening towards apex; **Tep** free for 5 - 7 mm, tips spreading to 10 - 12 mm.

Red- and yellow-flowered plants occur together in one population.

A. xabhaica Lavranos & Collenette (CSJA 72(2): 87, ills. (p. 85), 2000). **T:** Saudi Arabia, Asir Prov. (*Collenette* 7165 [K]). – **D:** Saudi Arabia. **I:** Collenette (1999: 18).

= *A. pseudorubroviolacea* $\times$ *A. edentata*.

A. abyssicola Lavranos & Bilaidi (CSJA 43(5): 204-208, ills., 1971). **T:** Yemen (*Lavranos & Bilaidi* 7490 [FI]). – **D:** Yemen; cliff faces, 900 m.

[3] Acaulescent or with very short stems, simple, pendulous; **L** up to 50, rosulate, pointing downwards, 50 $\times$ 12 cm, grey-green, upper surface flat becoming canaliculate towards tip; marginal teeth obtuse, hard, dark, 1 mm, 35 - 40 mm apart; **Inf** to 60 cm, growing downwards with only tips of racemes curved upwards, with 5 - 6 short spreading **Br**; peduncle yellow-green; racemes lax; **Bra** ovate-lanceolate, 7 - 8 $\times$ 3 mm; **Ped** 8 - 9 mm, green; **Fl** yellow-green, 25 mm, base rounded, 7 mm $\varnothing$ across **Ov**, narrowed to 5 mm above, enlarging to 8 mm at mouth; **Tep** free for 7 mm.

A. aculeata Pole-Evans (Trans. Roy. Soc. South Afr. 5: 34, 1915). **T:** RSA, Northern Prov. (?*Pole-Evans in Govt. Herb.* 55 [PRE]). – **D:** Zimbabwe, RSA (Northern Prov.); rocky or stony mountain slopes, in hot semi-arid areas. **I:** Reynolds (1950: 448-449).

[5] Acaulescent or with procumbent stem to 80 cm, usually simple; **L** $\pm$ 30, densely rosulate, lanceolate-attenuate, to 60 $\times$ 8 - 12 cm, arcuate-erectly incurved, dull green to glaucous with scattered reddish-brown prickles; marginal teeth 5 - 6 mm, pungent, reddish-brown, 10 - 20 mm apart; **Inf** 1 m, with 2 - 4 **Br**; peduncle deep brown; racemes cylindrical, 40 - 60 $\times$ 7 cm, dense; **Bra** deltoid-acuminate, reflexed, 10 $\times$ 7 mm; **Ped** 2 - 3 mm; **Fl** le-

mon-yellow with green-orange veins on lobes, 25 - 40 mm, base rounded; **Tep** free for 14 mm; **St** exerted 15 mm. – *Cytology*: $2n = 14$ (Müller 1941).

Leaf marginal teeth and surface prickles sometimes arise from white tuberculate bases, and racemes vary in length. Natural hybrids with other species have been reported (Reynolds 1950).

A. acutissima H. Perrier (Mém. Soc. Linn. Normandie, Bot. 1(1): 17, 1926). **T** [syn]: Madagascar (Perrier 1107 [P?]). – **D**: Madagascar.

A. acutissima var. **acutissima** – **D**: Madagascar; thin soil on rocks, 240 - 1200 m. **I**: Reynolds (1966: 495-497). **Fig. X.d**

[15] Caulescent, much branched; stem to 1 m, 2 - 3 cm Ø, erect, divergent or decumbent; **L** ± 20 , subdensely rosulate and persistent for 20 - 30 cm below, lanceolate, long-attenuate, 30×4 cm, grey-green tinged reddish; marginal teeth 3 mm, pungent, pale brown, 1 cm apart; sheath green-striate; **Inf** 50 cm, with 2 - 3 **Br**; racemes cylindrical-acuminate, 10 - $15 \times 5 - 6$ cm, sub-dense; **Bra** deltoid, clasping the **Ped**, 10 - 15 mm; **Ped** 15 mm, reddish-scarlet; **Fl** 30 mm, reddish-scarlet, base attenuate, 5.5 mm Ø across **Ov**, slightly narrowed above and enlarging towards throat; **Tep** free for 10 mm. – *Cytology*: $2n = 14$ (Brandham 1971).

Variable in size of stems, leaves and flowers. Plants at higher altitudes are more robust.

A. acutissima var. **antanimorensis** Reynolds (JSAB 22(1): 27-29, ill., 1956). **T**: Madagascar (Reynolds 7792 [TAN, K, P, PRE]). – **D**: Madagascar; flat rock surfaces among thorn bushes. **I**: Reynolds (1966: 498).

[15] Differs from var. *acutissima*: Stems shorter, thinner; **L** 10 - $15 \times 1.5 - 2$ cm; **Inf** mostly simple; racemes shorter; **Ped** 10 mm; **Fl** 20 - 25 mm. – *Cytology*: $2n = 14$ (Brandham 1971).

A. adigratana Reynolds (JSAB 23(1): 1-3, ill., 1957). **T**: Ethiopia, Tigre Prov. (Reynolds 8076 [PRE, K]). – **D**: Ethiopia; rocky hills, 1800 - 2700 m. **I**: Reynolds (1966: 215-216).

Incl. *Aloe abyssinica* Hooker fil. (1900) (*nom. illeg.*, Art. 53.1); **incl.** *Aloe eru* var. *hookeri* A. Berger (1908).

[15] Caulescent, branching; stem erect to 1 m, 12 cm Ø, decumbent to 2 m; **L** 16 - 20, rosulate, spreading and slightly recurved, ensiform, 60 - 80 $\times$ 15 cm, dull green with pale green spots; marginal teeth 10 mm, 25 - 35 mm apart, pungent; exudate drying deep brown; **Inf** 90 cm with 3 - 5 **Br**; racemes cylindrical-conical, 15 - $20 \times 8 - 9$ cm, dense; **Bra** deltoid, 8×3 mm; **Ped** 18 mm; **Fl** orange or yellow, 28 - 33 mm, clavate, base attenuate, 6 mm Ø across **Ov**; **Tep** free for 14 - 16 mm.

On the 2 possible synonyms, Reynolds (1966) states "The following almost certainly belong here".

A. affinis A. Berger (in Engler, A. (ed.), Pflanzenr. IV.38 (Heft 33): 206, 1908). **T**: RSA, Mpumalanga (Wilms 1490 [not located]). – **D**: RSA (Mpumalanga); on sandstone or quartzite in mountainous areas, 1220 - 1520 m. **I**: Reynolds (1950: 243-244).

[3] Acaulescent, simple; **L** ± 20 , densely rosulate, arcuate-erect, 30 - $45 \times 9 - 11$ cm, green with longitudinal dark lines, with prominent horny, reddish-brown margin; marginal teeth 5 - 8 mm, pungent, 10 - 15 mm apart; exudate dries pale yellow; **Inf** to 1 m with 5 - 10 **Br**; racemes cylindrical, to 25 cm, rather dense; **Bra** narrowly deltoid, 15 mm; **Ped** 15 mm; **Fl** dull brick-red, 45 mm, base rounded, 9 - 10 mm Ø across **Ov**, abruptly narrowed to 5 - 6 mm above, then slightly decurved and enlarging towards mouth; **Tep** free for 10 mm; **St** exerted 0 - 1 mm.

Reynolds (1950) reports some variants with leaves obscurely spotted on the upper surface. Natural hybrids with other species have been reported by the same author.

A. africana Miller (Gard. Dict., Ed. 8, [no. 4], 1768). **T**: not typified. – **D**: RSA (Eastern Cape); mostly bush and scrub country. **I**: Reynolds (1950: 457-458). **Fig. X.e**

$\equiv$ *Pachidendron africanum* (Miller) Haworth (1821); **incl.** *Aloe perfoliata* var. β Linné (1753); **incl.** *Aloe perfoliata* var. *africana* Aiton (1789); **incl.** *Aloe pseudoafricana* Salm-Dyck (1817); **incl.** *Aloe africana* var. *angustior* Haworth (1819); **incl.** *Aloe africana* var. *latifolia* Haworth (1819); **incl.** *Aloe angustifolia* Haworth (1819) $\equiv$ *Pachidendron angustifolium* (Haworth) Haworth (1821); **incl.** *Pachidendron africanum* var. *angustum* Haworth (1821); **incl.** *Pachidendron africanum* var. *latum* Haworth (1821); **incl.** *Aloe bolusii* Baker (1880).

[9] Caulescent, usually simple; stem erect, to 4 m, dead **L** persistent; **L** ± 30 , densely rosulate, spreading to recurved, 65×12 cm, dull green to glaucous, upper face glabrous or with few reddish prickles near tip, lower face with median reddish prickles near tip; marginal teeth 4 - 5 mm, pungent, 15 mm apart; **Inf** 60 - 80 cm with 2 - 4 **Br**; racemes cylindrical-acuminate, 40 - $60 \times 10 - 12$ cm, dense; **Bra** ovate-lanceolate, $11 \times 7 - 8$ mm; **Ped** 5 - 6 mm; **Fl** yellow to yellow-orange, 55 mm, base rounded, 5 - 6 mm Ø across **Ov**, enlarging to 8 mm at mouth, upper $\frac{1}{2}$ markedly upcurved; **Tep** free for 19 mm; **St** exerted 15 mm.

Natural hybrids with other species have been reported (Reynolds 1950).

A. ahmarensis Favell & al. (CSJA 71(5): 257-259, ill., 1999). **T**: Yemen (*al-Gifri* 3776 [Herb. Univ. Aden]). – **D**: Yemen; valley bottoms and basalt lava flows in sparsely vegetated sandy plains, ± 500 m.

[7] Caulescent or usually acaulescent, solitary or usually suckering to up to 25 **Ros**; stem procumb-

ent, to 50 cm; **L** $\pm$ 12, densely rosulate, deltoid-arcuate, ascending, $\pm$ 30 $\times$ 9 cm, upper face pale pinkish-grey with waxy bloom, lower face greenish-grey with a bloom; marginal teeth 2 - 3 mm, dark brown, 18 - 30 mm apart; exudate honey-coloured; **Inf** 65 cm, ascending, with many **Br**, lower **Br** rebranched; racemes cylindrical, subdense, **Bra** ovate-deltoid, 6 $\times$ 2 mm; **Ped** 7 - 8 mm, pink; **Fl** bright coral-pink, yellowish at the tip, 33 mm, base rounded, 8 mm $\varnothing$ across **Ov**, narrowing above to 6 mm, widening to 7 mm at the tip; **Tep** free for 10 mm; **St** exerted 1.5 mm.

A. albida (Stapf) Reynolds (JSAB 13(2): 101, 103, 1947). **T:** RSA, Mpumalanga (*Galpin* 873 [PRE]). – **D:** RSA (Mpumalanga); stony ground or on rocks, 1450 - 1520 m. **I:** Reynolds (1950: 112-113, t. 2); FPA 51: t. 2010, 1990. **Fig. X.f**

$\equiv$ *Leptaloe albida* Stapf (1933); **incl.** *Aloe kraussii* var. *minor* Baker (1896) $\equiv$ *Aloe myriacantha* var. *minor* (Baker) A. Berger (1908); **incl.** *Aloe kraussii* Schönland (1903) (*nom. illeg.*, Art. 53.1).

[1] Acaulescent, usually simple; **R** fusiform; **L** 6 - 12, rosulate, linear, 10 - 15 $\times$ 0.4 - 0.5 cm, dull green; marginal teeth 0.5 mm, 1 mm apart; **Inf** 9 - 15 cm, simple; raceme capitate, 2 - 5 $\times$ 5 cm with 8 - 16 **Fl**; **Bra** ovate-acuminate, 10 - 15 mm; **Ped** 10 - 15 mm; **Fl** dull creamy-white, green-tipped, 18 mm, base attenuate, narrowed slightly above **Ov** to bilabiate mouth; **Tep** free to base; **St** exerted 0 - 1 mm. – *Cytology*: 2n = 14 (Müller 1945: as *Leptaloe*).

A. albiflora Guillaumin (Bull. Mus. Nation. Hist. Nat., Sér. 2, 12: 353, 1940). **T:** Madagascar, Toliara (*Boiteau* 227 p.p. [P]). – **D:** Madagascar. **I:** Reynolds (1966: 406-407).

$\equiv$ *Guillauminia albiflora* (Guillaumin) A. Bertrand (1956).

[1] Acaulescent, suckering to form small clumps; **R** fusiform; **L** 10, rosulate, linear-attenuate, 15 $\times$ 1.5 cm, grey-green with many small dull-white spots, with narrow dull-white cartilaginous margin; marginal teeth 0.5 - 1 mm, soft to firm; **Inf** 30 - 36 cm, simple; raceme 9 cm, lax, with $\pm$ 18 **Fl**; **Bra** ovate-long acuminate, 5 - 6 $\times$ 2 mm; **Ped** 8 mm; **Fl** white, 10 mm, base rounded, campanulate, 14 mm $\varnothing$ across mouth; **Tep** free to base; **St** exerted 8 mm.

A. albovestita S. Carter & Brandham (Bradleya 1: 20-21, ill., 1983). **T:** Somalia, Burao Region (*Bailes* 214 [K]). – **D:** Somalia; rocky ground and rock crevices, often in deep shade, $\pm$ 1450 m.

[7] Acaulescent, suckering to form small clumps; **L** rosulate, lanceolate, 20 - 30 $\times$ 12 cm, glaucous, distinctly longitudinally striate, upper face with few paler spots, with narrow cartilaginous margin; marginal teeth 1.5 mm, red-brown, 5 - 10 mm apart; **Inf** 75 cm, with 2 - 3 **Br**; racemes cylindrical to subcapitate, 10 - 20 $\times$ 5 cm; **Bra** lanceolate, 15 $\times$ 3 mm;

Ped 18 mm; **Fl** dull pink with greyish tip, finely white-flecked and densely covered with white bloom; 25 - 33 mm, base rounded, 7 mm $\varnothing$ across **Ov**, narrowed to 4.5 mm above; **Tep** free for 7 mm. – *Cytology*: 2n = 14.

A. aldabrensis (Marais) L. E. Newton & G. D. Rowley (Excelsa 17: 59, 1997). **T:** Aldabra Archipelago, West Island (*Stoddart* 920 [K]). – **D:** Aldabra Archipelago (Astove Atoll [Seychelles]; limestone in mixed scrub or thickets, almost sea-level.

$\equiv$ *Lomatophyllum aldabrense* Marais (1975).

[8] Acaulescent or caulescent; stem erect or decumbent, to 2 m; **L** densely rosulate, linear-lanceolate to ensiform, long-attenuate, 60 - 100 $\times$ 4 - 10 cm, green, often tinged orange or red, with horny margin; marginal teeth small; **Inf** 15 - 35 cm, with 3 - 5 **Br**, rarely rebranched; racemes cylindrical, subdense; **Bra** ovate to deltoid, 2.5 - 4.5 mm; **Ped** 12 - 20 mm; **Fl** bright orange-red, 18 - 25 mm, base shortly attenuate; **Tep** free for slightly more than $\frac{1}{2}$; **St** slightly exerted; **Fr** berries.

A. alfredii Rauh (CSJA 62(5): 232-233, ill., 1990). **T:** Madagascar (*Rauh* 68690 [HEID]). – **D:** C Madagascar; quartz fields, 1400 m.

[11] Caulescent, branching at base; stem 25 $\times$ 1.5 cm; **L** scattered along stem, linear, 30 $\times$ 1.5 cm, dark dull green; marginal teeth 1 mm, white; sheath 15 mm, red-brown with darker veins; **Inf** 60 cm, simple; raceme cylindrical, 8 - 10 $\times$ 5 - 6 cm, many-flowered; **Bra** triangular, 5 mm; **Ped** 5 mm; **Fl** lemon-yellow with green mid-stripe, 20 mm, base rounded.

A. alooides (Bolos) van Druten (BT 6(3): 544-545, 1956). **T:** RSA, Mpumalanga (*MacLea* s.n. in *BOL* 3011 [BOL, SAM]). – **D:** RSA (Mpumalanga); dolomite outcrops in mountains, 1700 - 2000 m. **I:** Reynolds (1950: 437-438, t. 58, as *A. recurvifolia*). **Fig. XI.a**

$\equiv$ *Urginea alooides* Bolus (1881) $\equiv$ *Notosceptrum alooides* (Bolos) Benth (1883); **incl.** *Aloe recurvifolia* Groenewald (1935).

[8] Caulescent; stem usually simple, rarely branched low down, erect, stout, 2 m, covered with remains of dead **L**; **L** densely rosulate, lanceolate-ensiform, long-attenuate, deeply canaliculate, arcuate-recurved, 130 $\times$ 18 cm, green, sometimes slightly reddish, usually with distinct reddish margin; marginal teeth 2 - 3 mm, usually curved towards **L** tip, 10 mm apart, brownish-tipped; **Inf** 1.3 m, erect, simple; raceme narrowly cylindrical, slightly acuminate, 80 $\times$ 4.5 cm, dense; **Bra** ovate-acute, 5 - 7 $\times$ 4 - 5 mm; **Ped** none; **Fl** sessile, lemon-yellow, 9 mm, base rounded, campanulate, 8 mm $\varnothing$ across mouth; **Tep** free to base; **St** exerted 7 - 8 mm.

A. ambigens Chiovenda (Pl. Nov. Min. Not. Ethiop. 1: 6, 1928). **T:** Somalia (*Puccioni & Stefani* 447 [FI]). – **D:** Somalia; bushland on steep limestone rock faces, ± 250 m.

[15] Caulescent, branching; stem to 40 cm; **L** 5 - 15, laxly rosulate, to $20 \times 2 - 3$ cm, glaucous green, sometimes with a few paler spots; marginal teeth to 1 mm, white, 10 - 20 mm apart; **Inf** to 1 m, with up to 8 **Br**; racemes cylindrical, 4 - 12 cm, lax; **Bra** 5×3 mm; **Ped** 4 mm; **Fl** red or yellow, 20 - 25 mm, 7 mm $\varnothing$ across **Ov**; **Tep** free for 6 mm; **St** not exerted.

A. amicum L. E. Newton (CSJA 63(2): 80-81, ill., 1991). **T:** Kenya, Eastern Prov. (*Newton* 3217 [K, EA]). – **D:** Kenya; ledges on steep rock face, 1450 m.

[13] Caulescent, branching sparsely near base; stem pendulous, 112×2.5 cm $\varnothing$, covered with dead sheathing **L** bases; **L** laxly rosulate but curving to give almost distichous appearance, falcate, 46×5.5 cm, bluish-green, tinged purplish-red in sun, sometimes with few scattered whitish spots on upper face, surface slightly rough, with narrow white cartilaginous margin; marginal teeth 1 mm, 8 - 10 mm apart, red-tipped; apex obtuse with 1 - 2 minute teeth; exudate yellow, drying brownish-yellow; **Inf** 76 cm, slightly ascending, almost horizontal, with 6 **Br**, lightly covered with white bloom; racemes with second **Fl**, 8 - 27 cm, lax; **Bra** triangular, 3.5×2.5 mm; **Ped** 8 mm; **Fl** crimson with a light cover of white bloom, margins of lobes creamy-white, 28 mm, base truncate, 11 - 12 mm $\varnothing$ across **Ov**, narrowed to 7 mm above, lobes spreading to 10 mm; **Tep** free for 10 - 11 mm.

A. amudatensis Reynolds (JSAB 22(3): 136-137, ill., 1956). **T:** Uganda, Karamoja (*Reynolds* 7996 [PRE, EA, K]). – **D:** Kenya, Uganda; dry bushland, 1340 - 1800 m. **I:** Reynolds (1966: 77).

[6] Acaulescent, suckering to form small to large dense clumps; **L** ± 12 , densely rosulate, lanceolate-attenuate, 22×5 cm, dull green with oval white spots in irregular transverse bands, with white-cartilaginous margin; marginal teeth 2 mm; **Inf** 50 - 65 cm, mostly simple, sometimes with 1 - 2 **Br**; racemes cylindrical, slightly conical, $8 \times 6 - 7$ cm, sub-lax; **Bra** ovate-deltoid, 10×3 mm; **Ped** 17 mm; **Fl** rose-pink to coral-red, 23 mm, base truncate, 9 mm $\varnothing$ across **Ov**, abruptly narrowed to 6 mm above, then enlarging towards mouth; **Tep** free for 7 mm; **St** exerted 0 - 1 mm. – *Cytology*: $2n = 14$ (Brandham 1971).

A natural hybrid with *A. tweediae* has been reported (Reynolds 1966).

A. andongensis Baker (Trans. Linn. Soc. London, Bot. 1: 263, 1878). **T:** Angola, Cuanza Norte (*Welwitsch* 3729 [BM, K, LISU]). – **D:** Angola.

A. andongensis var. **andongensis** – **D:** Angola; exposed rocks, 1050 - 1525 m. **I:** Reynolds (1966: 347).

[15] Caulescent, branching; stem ascending, sometimes becoming decumbent, 30 - 60 cm; **L** ± 14 , rosulate, persistent for 30 cm below, lanceolate-attenuate, $20 - 25 \times 6 - 7$ cm, dull grey-green, upper face mostly without spots, sometimes sparingly spotted, lower face usually with many crowded white spots near base, with slight cartilaginous margin; marginal teeth 2 - 3 mm, 5 - 7 mm apart; **Inf** 30 - 40 cm, with 2 - 3 **Br**; racemes subcapitate to cylindrical-acuminate, $6 - 12 \times 6 - 8$ cm; **Bra** lanceolate-acute, $5 - 8 \times 3$ mm; **Ped** 14 - 18 mm; **Fl** pale orange-scarlet, paler at mouth, 25 mm, base shortly attenuate, 5 - 6 mm $\varnothing$ across **Ov**, narrowed to 4 - 5 mm above, enlarging to 6 - 7 mm at mouth; **Tep** free for 8 mm. – *Cytology*: $2n = 14$ (Brandham 1971).

A natural hybrid with *A. gossweileri* has been reported (Reynolds 1966).

A. andongensis var. **repens** L. C. Leach (JSAB 40(2): 115-116, ill., 1974). **T:** Angola, Cuanza Sul (*Leach & Cannell* 13950 [LISC, BM, BR, K, PRE, SRGH]). – **D:** Angola; slopes of rounded granite hills.

[13] Differs from var. *andongensis*: Stem prostrate, forming large spreading clumps; **L** smaller, proportionately narrower, more copiously white-spotted, the spots tending to be in wavy transverse bands; marginal teeth more crowded.

A. andringitrensis H. Perrier (Mém. Soc. Linn. Normandie, Bot. 1(1): 41, 1926). **T:** Madagascar, Fianarantsoa (*Perrier* 13637 [P]). – **D:** Madagascar; gravelly places, 2000 - 2600 m. **I:** Reynolds (1966: 452-453).

[3] Acaulescent, simple; **R** fusiform; **L** 15 - 20, rosulate, triangular, 50×7 cm, grey-green, surface very slightly asperulous; marginal teeth 1 mm, pinkish, 5 - 10 mm apart; **Inf** 80 - 90 cm, with 6 - 8 **Br**; racemes subcapitate, 6 - 10 cm, dense; **Bra** ovate-acute, 8×3 mm; **Ped** 25 mm; **Fl** dull orange to yellowish, 22 mm, base rounded, 4 mm $\varnothing$ across **Ov**, enlarging upwards to 9 mm at mouth; **Tep** free for 17 mm; **St** not exerted. – *Cytology*: $2n = 14$ (Resende 1937).

A. angelica Pole-Evans (FPSA 14: t. 554 + text, 1934). **T:** RSA, Northern Prov. (*Pole-Evans* s.n. [PRE 13040]). – **D:** RSA (Northern Prov.); rocky slopes. **I:** Reynolds (1950: 471-472).

[9] Caulescent, simple or branched; stem 3 - 4 m, upper $\frac{1}{2}$ covered with dead **L** remains; **L** densely rosulate, ensiform, youngest spreading, oldest much recurved, $80 \times 10 - 12$ cm, green, with brownish-red margin; marginal teeth 2 - 3 mm, brownish-red, pungent, 10 mm apart; **Inf** with up to 20 **Br**; racemes densely capitate, $8 - 10 \times 8 - 10$ cm; **Bra**

ovte-acute, 8 - 10 × 8 - 10 mm; **Ped** 25 mm; **Fl** greenish-yellow to yellow, 25 mm, ventricose with mouth slightly upturned, base rounded; **Tep** free for 18 mm; **St** exerted 15 mm. – *Cytology*: 2n = 14 (Riley 1959: 241).

Natural hybrids with other species have been reported (Reynolds 1950).

A. angolensis Baker (Trans. Linn. Soc. London, Bot. 1: 236, 1878). **T**: Angola, Loanda Prov. (*Welwitsch* 3728 [BM, LISU]). – **D**: Angola; wooded hills. **I**: Reynolds (1966: 311).

[18] Very shortly caulescent; **L** densely rosulate, lanceolate-ensiform, very fleshy, 60 × 4 - 5 cm, glaucous; marginal teeth 2 mm, 15 - 20 mm apart; **Inf** 90 cm, simple or with 1 - 3 arcuate-erect **Br**; racemes cylindrical, slightly acuminate, ± 10 cm, dense; **Bra** ovate-acute, 10 mm; **Ped** 3 - 6 mm; **Fl** sulphur-yellow, 20 - 24 mm, base rounded; **Tep** free for < 10 mm.

A little-known species, whose identity is in doubt. Reynolds (1966) suggested that it might belong to the *A. littoralis*-complex.

A. anivoranoensis (Rauh & Hebding) L. E. Newton & G. D. Rowley (Bradleya 16: 114, 1998). **T**: Madagascar (*Rauh* 22864 [HEID]). – **D**: NE Madagascar; limestone rocks in deciduous forest. **I**: Rauh (1998: 99, as *Lomatophyllum*).

≡ *Lomatophyllum anivoranoense* Rauh & Hebding (1998).

[11] Caulescent; stems 1 or branching at the base, to 30 cm, thin at base, thicker towards tip, up to 2 cm Ø; **L** 8 - 10, scattered along stem, erect when young, curved downwards when older, linear, up to 30 × 2 cm, canaliculate, tip long attenuate and often spirally coiled, blue-green; marginal teeth deltoid, 2 mm, 1 - 1.5 mm apart; sheath 1 - 2 cm, white tinged reddish; **Inf** simple, erect or ascending; raceme up to 10 cm, lax, with 15 - 30 **Fl**; **Bra** triangular, long-attenuate, up to 15 mm; **Fl** bright cinnabar-red, whitish with green midstripe at tip, 25 - 30 mm, scarcely constricted above **Ov**, slightly curved; **Tep** free almost to base; **St** exerted 10 mm; **Fr** berries, 15 × 12 mm.

The description of the protologue states that the outer tepals are united for 3 - 5 mm, but in the accompanying Fig. 17 they seem to be united almost to the tip.

A. ankaranensis Rauh & Mangelsdorff (KuaS 50(10): 273-275, ill., 2000). **T**: Madagascar (*Mangelsdorff* s.n. in *BG Heidelberg* 74805 [HEID]). – **D**: NW Madagascar; shady undergrowth on eroded limestone.

[2] Acaulescent; **Ros** mostly solitary, 35 - 40 cm Ø; **L** to 15, densely rosulate, spreading, curved upwards in drought, broadly lanceolate, 3.5 - 5 cm wide, dark green to brown-green with whitish-grey flecks and streaks; marginal teeth 2 mm, white, 5 - 8

mm apart; exudate yellow; **Inf** to 17 cm, erect, simple, sometimes with bulbils in **Ax** of sterile **Bra**; racemes cylindrical, 8 × 6 cm, lax, with ± 20 **Fl**; **Bra** triangular, brownish-red, > 3 mm; **Ped** ± 3 mm; **Fl** cinnabar-red, lobes paler with wide green midstripe, 25 - 27 mm, obscurely 3-angled, 6 mm Ø; **Tep** free for ± 5 mm; **St** scarcely exerted; **Fr** berries, globose, 10 - 15 mm Ø.

A. ankoberensis M. G. Gilbert & Sebsebe (KB 52(1): 146-147, 1997). **T**: Ethiopia, Shewa Region (*Ash* 2353 [K]). – **D**: Ethiopia; steep rocky slopes and cliffs, 3000 - 3500 m.

[13] Caulescent, usually simple; stem pendulous, to 6 m; **L** densely rosulate, 20 - 30 × 7 - 17.5 cm, dull greyish- to bluish-green; marginal teeth 2 - 3 mm, pale, usually with minute dark reddish-brown tip, 0.7 - 1.9 mm apart; **Inf** descending at base and curving upwards again with U-bend, with 1 - 6 **Br**; racemes cylindrical, 6 - 8 cm, dense; **Bra** ovate-lanceolate, acute, 14 - 25 × 5 - 6.5 mm; **Ped** (6-) 10 - 25 mm; **Fl** bright orange-red, 35 - 40 mm, 6 - 10 mm Ø when pressed; **Tep** free for 12 - 22 mm.

A. antandroi (Decary) H. Perrier (Mém. Soc. Linn. Normandie, Bot. 1(1): 19, 1926). **T**: Madagascar (*Decary* s.n. [P]). – **D**: Madagascar; dry limestone rocks or rubble, 165 m. **I**: Reynolds (1966: 491-492).

≡ *Gasteria antandroi* Decary (1921); **incl.** *Aloe leptocaulon* Bojer (1837) (*nom. inval.*, Art. 32.1c).

[14] Caulescent, branching at or near base; **R** woody; stem usually partly supported by surrounding vegetation, 60 - 100 × 0.5 - 0.7 cm; **L** 12 - 20, laxly rosulate, triangular, 10 - 15 cm × 6 - 10 mm, grey-green, upper face sometimes with a few scattered small white spots, lower face with many dull white spots, apex obtusely rounded with ± 3 small soft white teeth; marginal teeth 0.5 - 1 mm, white to very pale brown, 7 - 10 mm apart; sheaths green-striate, 10 mm apart; **Inf** 16 cm, simple or with 1 **Br**; racemes subcapitate, 3 × 5 cm, lax, ± 10 **Fl**; **Bra** ovate-acute, 4 × 3 mm; **Ped** 8 mm; **Fl** scarlet, 22 mm, base truncate, 6 mm Ø across **Ov**, slightly narrowed above and enlarging towards mouth; **Tep** free for 15 - 16 mm. – *Cytology*: 2n = 14 (Brandham 1971).

A. antsingyensis (Léandri) L. E. Newton & G. D. Rowley (Excelsa 17: 59, 1997). **T** [syn]: Madagascar (*Decary* 7936 [K]). – **D**: Madagascar; limestone, in shade. **I**: Rauh (1995a: 79, 329).

≡ *Lomatophyllum antsingyense* Léandri (1935).

[13] Caulescent; stem decumbent, to 1 m, 1 cm Ø; **L** scattered along stem, linear, 20 - 50 × 2 cm, dull green; marginal teeth to 1 mm, 10 mm apart; sheath 2 - 3 cm, striate, with white spots; **Inf** 10 - 12 cm, simple; racemes cylindrical, lax, with 15 - 30 **Fl**; **Bra** acute, ± 8 - 10 mm; **Ped** 8 - 10 mm; **Fl** red, green-tipped, ± 20 mm, base rounded, ± 8 mm Ø

